CAMPO HILLS TREATMENT PLANT OPERATIONS PLAN

300-gpm Water Treatment Plant

Campo Hills Project
Campo, California

ORIGINAL PREPARER OF OPERATIONS PLAN (SEPTEMBER 7, 2004):

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272 Cedar Avenue
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Registered Civil Engineer #23442

REVISOR OF OPERATIONS PLAN (SEPTEMBER 22, 2010):

County of San Diego
5555 Overland Avenue
San Diego, California

OWNER OF WATER PLANT:

San Diego Public Works Department
C/O Milica Kaludjerski
5555 Overland Avenue
Building #2, Room #260 (MS-0384)
San Diego, CA 92123-1295

DESIGN PREPARED BY:

Richard Pata Engineering
272 Cedar Avenue
El Centro, California 92243
Mr. Richard Pata, PE
Phone: 760-352-0386

FACILITY LOCATION:

1247 Sheridan Road
Campo, California 91906
Contact: Ron Basil
Phone: 619-660-2008
Cell: 858-204-1648

WEEKDAY STAFFING:

Ron Basile
Water Treatment T1 # 25825
Water Distribution D1, #16779
Phone: 619-660-2008
Cell: 858-204-1648

STAFFING TWO TIMES PER WEEK
Rocky Vandergriff
Water Treatment, T3, #2521
Phone: 760-427-4235

SYSTEM MANUFACTURER:

Richard Pata Engineering /
Water Treatment Services
272 Cedar Avenue
El Centro, California 92243
Phone 760-352-0386

I. OVERVIEW OF TREATMENT PLANT

A. Background

The Campo Hills water treatment plant is located at 1247 Sheridan Road just outside of Campo, California off of State Route 94. See APPENDIX A for a vicinity map of the facility location. It is owned and operated by the San Diego County Public Works Department. This plant provides potable water for the 222 homes in the Campo Hills Housing Division.

The water treatment plant for Campo Hills has been designed to exceed the estimated maximum demand of 300,000-gpd by the 222 homes. The treatment system includes two PV-150 packaged treatment plants, one negative ion exchange system for uranium removal, and chemical injection systems for coagulation, corrosion protection, and disinfection. The entire water treatment system is designed to produce potable water at a rate of 300-gpm. The existing process flow diagram is attached in APPENDIX B.

The treatment plant will be operated by contract operators and County personnel. The personnel responsible for operations are listed in the Section III (Emergency Response Plan). Daily weekday operations will be performed by a County employee with a T1 or T2 certification. The plant will be checked twice per week by a T3 certified contract operator. The T3 Operator will be available to assist in responding to emergencies.

B. Overview of Treatment Plant Operations

Each PV-150 water treatment plant, the uranium removal system, and the chemical injection system are designed to continuously treat water for the Campo Hills Housing Division utilizing source water from three wells adjacent to the project site.

1. Raw Water Service

Raw water for the Campo Hills project is provided from three 12"ϕ 70-ft deep wells located in the extremities of the 100 year flood plane near the site. As a result of the wells' location and shallow depth, the source water has been deemed as "under the influence of surface water" and therefore requires a "physical barrier" thus the implementation of the dual PV-150 packaged water plants, Plant #1 and Plant #2. The well water is also above the MCL for uranium, approximately 30-50 pCi/L (picoCuries per Liter), and therefore requires a uranium removal system, thus the implementation of a negative ion exchange system.

Two active wells, Well #1 and Well #3 can simultaneously provide raw water for the treatment plant. Each well utilizes one 15-hp variable frequency drive pump to deliver water for the treatment process. Raw water feeds each PV-150 at a rate of

150-gpm. The combined 300-gpm water production of the dual PV-150's is then further treated by the negative ion exchange system for uranium removal. Well #2, a standby well, is only used for irrigation.

A Pilot Plant Study on the Campo Hills project coordinated by Richard Pata Engineering and Water Treatment Services showed that raw water turbidity from the three wells remained below 15 NTU before entering the plant.

2. Treated Water

Campo Hills treatment plant as described in this Plan, clarifies filters and disinfects water to Title 22 standards. Both PV-150 plants simultaneously produce and send water to the negative ion exchange system for uranium removal. Treated water is then stored in two FDA rated tanks. Treated water is first stored at the project site in two 40,000-gal bolted steel storage tanks in series. Once full, water from the second tank is lifted via two 25-hp vertical turbine pumps to a 705,000-gal bolted steel storage tank up a hill approximately one mile away and distributed to the 222 homes in the Campo Hills Housing Division. Phosphates and chlorine solutions are added at designated locations for iron/manganese control, corrosion control, and disinfection. Locations for the chemical injection point are shown in APPENDIX B.

II. PLANT OPERATION

A. Treatment Plant Process Description

1. A level switch located in the second 40,000-gal treated water storage tank sends a signal to start or stop the treatment plant.

2. Run time is determined by the float differential in the tank. Initial float differential is set at 18", which corresponds to approximately .5 hrs of plant operation.

3. Raw water from each well is lifted by its own 15-hp pump after the float switch triggers the activation thereof.

4. The water produced from Well #1 and #3 is treated through water treatment plant. The raw water produced by well #2 is directly piped for irrigation of common areas.

Processes 5-11 below apply to both PV-150 treatment plants and occur simultaneously. PV-150 As-Built drawing and schedule of materials are presented in APPENDIX C.

5. A chemical coagulant aid, T Flock IFD 201, was injected prior to entering the Coagulation / Flocculation Chamber (CFC) using a chemical feed pump, LMI 0 to 18 gal/day pulse-stroke adjustable chemical-feed pump during the start-up.

Coagulant was found to be unnecessary after that time, so the coagulant injection system stays as on stand-by only. See APPENDIX D for the chemical information.

6. Polyphosphate agents, CP-37, are injected prior to filtration unit for sequestering iron and manganese ions using an 18 gal/day maximum pulse-stroke adjustable chemical feed pump from LMI, to reach 1 ppm polyphosphate residual in the system water. See APPENDIX D for the chemical information.

7. Water flows up through the 19-ft^2 CFC at a maximum rate of 8-gpm/ft^2 (152-gpm). The CFC contains the following media:
   a) 42" of non-buoyant NSF approved media (2 to 3mm).
      (See APPENDIX D for NSF Letter of Approval for clarifier media)

8. The clarified water then spills to each side into two 15-ft^2 Dual Media Filter compartments (DMF). Each DMF contains the following media:
   a) 3" of #12 silica filter sand above under-drains (0.8 to 0.9mm).
   b) 12" of #20 silica filter sand. (0.4 to 0.5mm)
   c) 24" of 0.8 to 0.9mm anthracite.
      (See APPENDIX D for NSF Letter of Approval for filter media)

9. A 5-hp centrifugal filtrate pump continuously draws water from the bottom of each filter compartment. Individual throttling valves maintain a filtering rate of 5-gpm/ft^2 (150-gpm each).

10. The filtered water turbidity is continuously monitored using a turbidimeter.

11. Filtered water is sent to the ion exchange system for uranium removal.

12. The negative ion exchange system consisting of six 36"ϕ resin filter bodies each filled with 25-ft^3 of GW66 Type 1 NSF approved media safely reduces the uranium level of the filtered water at a rate of 300-gpm. The resin loading rate is 3.8 gpm/ft^2 for an average flow of 80 gpm. See APPENDIX E for the disposable resin ion exchange system engineering submittal.

13. Orthophosphate agents, CP-35, are injected after ion exchange system for corrosion inhibition using a 10 gal/day maximum pulse-stroke adjustable chemical feed pump from LMI to reach 1 ppm orthophosphate residual in the system water. See APPENDIX D for the chemical information.

14. A 12.5% sodium hypochlorite solution is then injected into the filtered water using an LMI 0 to 18-gal/day pulse-stroke adjustable chemical-feed pump. Target chlorine residual is 0.75-1.0 mg/L with minimum set at 0.75 ppm.

15. The treated water chlorine residual is continuously monitored as the water goes to storage.

16. Initially the treated water is stored in two 40,000-gal bolted steel above ground storage tanks adjacent to the plant. The tanks are piped in series. Both tanks are filled from the top and discharge from the bottom on the opposite side.

17. A stop/start switch in the 705,000-gal tank (approximately one mile away) signals two 25-hp vertical turbine pumps to deliver water from the second 40,000-gal tank when needed.

18. During normal distribution the 705,000-gal tank provides water for the Campo Hills Housing Division.

19. The 705,000-gal storage tank is located approximately 250-ft above the treatment plant site. Under a filter backwash condition a second port on this tank opens delivering 300-gpm at 85-psi of treated water during the backwash cycle.

20. Sampling site and schedule for coliform monitoring is dictated in the APPENDIX F Bacteriological Sample Siting Plan.

B. Criteria for Length of Filter Run Process

With an average water demand of approximately 111,000-gpd and a peak demand of 300,000-gpd, the anticipated run time for the water treatment plant is approximately six hours per day for seven days a week (includes safety factors). This is based on pilot plant observations with similar conditions and demands.

C. Criteria for Length of Filter Backwash Process

Each dual media filter backwashes automatically once every two days for a period of approximately four minutes using treated water at a rate of 18-20-gpm/ft^2 (300-gpm). This is based on pilot plant observations, as well as visual inspection of the filter bed and backwash wastewater. The Plant operator can make necessary adjustments at his/her discretion according to the clarity of backwash wastewater.

D. Automatic Backwash Procedures

The dual media filter (DMF) and the Coagulation / Flocculation Chamber (CFC), are all timer controlled to backwash and rinse automatically at individual non-overlapping times. Time, duration and rates of the backwash cycle are all adjustable. The CFC is programmed to air scour with each rinse cycle. Both the DMF and the CFC can be air-scoured to further clean the media to compensate for operational deficiencies.

1. Automatic Rinse Procedure for Coagulation/Flocculation Chamber (CFC)

The CFC rinse is initiated from a 6"ϕ electrically operated butterfly valve located on top side of the CFC unit. The CFC is automatically rinsed on a predetermined schedule. It rinses up to four times a day with three to four minutes of air-scour utilized along with the 8 gpm/ft^2 (300-gpm) of rinse water for the normal rinse

cycle. A 7.5-hp regenerative air blower mounted directly on the plant supply air for the air scour cycle. The CFC can be manually rinsed as a fail-safe alternative.

2. Automatic Backwash Procedure for Dual Media Filter (DMF)

The DMF backwashes are initiated from a 3"ϕ electrically operated valve located at the base of the filter unit. Backwash cycles can be automatically initiated up to four times a day and a minimum of once a week. Backwash duration and rates are adjustable. Pressurized potable water from the distribution system provides water for the backwashing process at a rate of 20-gpm/ft^2 (300-gpm). The DMF can be manually backwashed and air scoured as a fail-safe alternative. The filters have a flow indicator and a throttling valve to regulate the flow through during the cycle. With each start-up of the treatment plant there is a filter to waste cycle.

E. Manual Backwash Procedures:

The DMF and the CFC can all be manually backwashed or rinsed and manually air-scoured as a fail-safe alternative to further clean the media, should it become necessary.

F. Disposal of PV-150 Waste Water

Filter-to-waste, filter backwash waste water and clarifier rinse waste water are delivered for irrigation of common area trees.

G. Disposal of Uranium Removal Filter Loaded Resin

The approved resin service provider is under contract for removal and proper disposal of the "loaded" resin for the uranium removal ion exchange system. Initially, the manufacturer of the system, Basin Water, assumed a loaded resin removal schedule of once every six months to a year. However, due to the lower level of uranium concentrations of the two active wells, only one resin exchange has occurred in summer 2009 during the period of 2004-2009. All waste will be monitored in accordance with 40 CFR 262.11. All disposal will comply with requirements for low level radioactive waste. Waste will be transported by a Department of Transportation certified hauler in accordance with 40 CFR 171 to 180. No resin backwash is allowed. For more detail, see APPENDIX E Disposable Resin Ion Exchange System Engineering Submittal.

H. Start-Up and Shutdown Procedures

1. To Start the Plant:

See APPENDIX G for the detailed description of startup and test period protocol for Campo Hills treatment plant.

a. Assure treated water storage and distribution lines are clean and disinfected.

b. Thoroughly inspect Plant:
    (1) Check chemical feed pumps chemical supply.
    (2) Check backwash/distribution pumps.
    (3) Inspect plumbing, tubing and wiring.
c. Assure there is adequate supply water.
d. Manually turn on the raw water pumps. Turn on supply valve.
e. Prime chemical feed pumps.
f. Adjust flocculent and chlorine chemical feed pumps to predetermined settings.
g. Turn on all power breakers.
h. Distribution pump breaker can be turned on **after** adequately treated water is available for pump priming.
i. Turn CONTROL breaker on.

    Note: Dual media filter and clarifier are pre-backwashed and pre-rinsed with chlorinated potable water before installation.

2. To Shutdown the Plant:

a. Turn off CONTROL breaker.

3. To Shutdown the Plant Long-term:

a. Backwash the DMF.
b. Rinse and air-scour the CFC.
c. Turn off CONTROL breaker.
d. Drain water from the treated-water turbidimeter chamber and wipe clean with dry cloth; reinstall covers.

I. Procedures for Adjusting and Monitoring Chemical Feed Equipment

Chemical solutions and initial chemical feed pump settings are based on pilot plant observations. Continuous turbidity and chlorine monitoring determine when and how much chemical dosing is required. This can be adjusted on each chemical feed pump.

1. Feed Pumps Used in Chemical Process

a. LMI 0 to 18-gal/day (pulse-stroke adjustable chemical-feed pump) for blended Coagulant & Cationic Polymer.
b. LMI 0 to 18-gal/day (pulse-stroke adjustable chemical-feed pump) for 1% polyphosphate residual.
c. LMI 0 to 10-gal/day (pulse-stroke adjustable chemical-feed pump) for 1% orthophosphate residual.
d. LMI 0 to 18-gal/day (pulse-stroke adjustable chemical-feed pump) of 12.5% Sodium Hypochlorite for 0.75-1.0 mg/L residual.

2. Chemical Calibration and Accuracy

Chemical feed pumps needs to be periodically calibrated to insure proper dosing. Operator checks for prime and pulse stroke settings and concurrently verifies the output of the pumps using a gradulated cylinder and a stop watch monthly. Calibrate turbidity and chlorine monitoring equipments according to the manufactures specifications included in **APPENDIX H**.

3. **Frequency**

   a. Continuous finished water turbidity monitoring with Turbidimeter.
   b. Continuous chlorine monitoring with Chlorine Analyzer.
   c. Phosphate levels are routinely monitored at storage tank with 1 ppm maximum concentration allowable.

J. Routine Plant Operations: Temperature > 15º C, pH < 7.5

1. Based on well water monitoring results, plant pH is less than 7.5 and water temperature is 15º or greater. Groundwater has consistent water quality and is not expected to vary. Although pH at the ion exchange unit effluent can drop below the inlet pH when new ion exchange media is placed in service, it will stabilize at the same pH as the inlet water.

   Routine Monitoring for pH and temperature: grab samples during each shift

   Ion exchange effluent

   Final 40,000 gallon tank effluent

2. **Filter Operation**

   Constant flow of 150 gpm/filter unit controlled by rate of flow controller

   150 gpm: Place one dual media filter on line

   300 gpm: Place two dual media filters on line

3. **Clarifier Operation**

   Constant flow of 150 gpm/clarifier controlled by rate of flow controller

   150 gpm: Place one unit on line

   300 gpm: Place two units on line

4. **Ion Exchange System Operation**

   100 gpm: Place one lead/lag filter pair unit on line
   200 gpm: Place two lead/lag filter pairs unit on line
   300 gpm: Place three lead/lag filter pairs unit on line

5. **Flow from plant to Tank No.1:**

   150 gpm: One booster at filter effluent on line
   300 gpm: Two boosters at filter effluent on line.

6. **Flow from Tank No. 2 to system**:

   150 gpm: One booster at reservoir effluent on line

300 gpm: Two boosters at reservoir effluent on line

7. **Chlorine Injection**:

Inject chlorine prior to Tank No.1:

Maintain a residual of 0.75-1.0 ppm at the effluent of Tank No. 2, with a minimum target value of 0.75 ppm.

8. **Chlorine Monitoring/Alarms:**

Tank No. 2 effluent: Continuous monitoring and recording, grab sample at each operator shift.
Alarm dials operator and shuts plant shut down at 0.75ppm.
Target is set at 0.75 ppm for Tank No. 2 effluent.

Summary of Dose Monitoring and Alarms

Flow	Location Chlorine Added	Location chlorine monitored	Minimum Chlorine Residual/Alarm set point
150 or 300 gpm	Influent to Tank No.1	Effluent of Tank No. 2	0.75 ppm

III. EMERGENCY RESPONSE PLAN

PLAN SHALL BE POSTED READILY ACCESSIBLE TO PLANT OPERATOR

In compliance with the *Surface Water Treatment Rule,* the Emergency Disinfection Plan (EDP) is to be implemented to prevent delivery of undisinfected or inadequately disinfected water. Failure of the Disinfection System can result from low free chlorine residual or from high turbidity in the water for distribution.

If the Plant fails to meet drinking water standards for chemical constituents, or in case of any plant malfunction, the employee at the facility shall be instructed to respond to the plant alarm by notifying by telephone the water plant operator or the owner as listed on the cover of this Operations Plan.

Non-potable signs shall be readily available to be posted at all drinking and hand washing locations.

A copy of the Water Quality Emergency Response Plan Form appears in APPENDIX I.

Below are listed various potential conditions that could effect the safe operation of the Plant and their required remedial action.

A. Water Treatment Plant Malfunction

1. Check distribution water for substandard quality.
2. Take Plant off-line (if required).
3. Pinpoint and rectify problem.
4. Be certain water is safe for customer consumption prior to returning plant to service by manually testing raw and finished water turbidity and chlorine levels.

B. Emergency Procedures

1. Chlorination: The "action level" for free chlorine residuals in domestic water prior to delivery to the distribution system is 0.75 mg/L to ensure a CT ratio greater than 1.0.

Plant Operation in Response to Monitoring/Alarm Conditions

Condition	Response	Return to normal operations
Residual at Tank No. 2 effluent is less than 0.75 ppm	Check chlorinator at ion exchange effluent. Add chlorine to Tank No.1 and Tank No. 2. Increase chlorine residual to 0.75 ppm or greater. Calculate CT per APPENDIX J of operations plan, or contact State DHS	Chlorine residual at clearwell effluent is 0.75 ppm or greater
pH at Tank No.1 influent is greater than 7.5	Contact ion exchange contracted maintenance company to check ion exchange unit. Calculate CT per APPENDIX J of operations plan or contact State DHS.	pH at clearwell influent is 7.5 or less
Temperature is less than 15º C	Check temperature at wells. Calculate CT per APPENDIX J of operations plan or contact State DHS.	Temperature is 15ºC or greater.
Chlorine residual at Tank No.2 effluent is greater than 1.0 ppm	Decrease application rate until residual is 0.75 to 1.0 ppm	Residual at Tank No. 2 effluent is 0.75 to 1.0 ppm

2. In the event the chlorine application system fails:

    a. Immediately make necessary repairs or replace damaged/defected component
    b. If repair/replace is not available:

For short periods of time the plant can be operated manually by feeding 12.5% liquid chlorine solution directly into the treated water storage.

        (1) Manually dose according to volume of water in treated water storage with 12.5% liquid chlorine at 0.75 to 1.0 mg/L. (approximately 0.25 liter of 12.5% solution in 5,000 gallons.)

3. Turbidity: The treated water "action level" for turbidity is as shown below:

    a. The design goal is 0.2 NTU.
    b. Turbidity must be equal to or less than 0.3 NTU in 95% of measurements taken each month.
    c. Turbidity shall not exceed 5.0 NTU at any time, or 1.0 NTU for more than eight consecutive hours while the plant is in operation.

4. Appropriate response to a chlorine residual loss or high turbidity in the finished water must be determined based upon the following:

    a. The magnitude of the problem
    b. The time needed for repairs
    c. The availability of emergency equipment

5. Uranium Concentration:

    a. The design goal is 15 pCi/L maximum for lead vessel effluent and the combined treat water uranium concentration.
    b. When the lead vessel effluent concentration reaches 15 pCi/L, the lead vessel resin shall be replaced. The compliance level is 20 pCi/L.
    c. The system shall be operational with multiple vessels out of service for resin replacement since the system is designed considering redundancy.

C. Water Treatment Plant Failure

In the event the operator is unable to bring turbidity, chlorine levels, or uranium concentrations into compliance by the procedures mentioned above, and the system fails to maintain a minimum free chlorine residual of 0.75 mg/L to the distribution system, then the following procedures are to be implemented in order:

1. The plant operator or the owner's representative shall notify:
   Health and Human Resources, Department of Health Services
   Drinking Water Field Operations San Diego Branch:

Sean Sterchi District Engineer 619-525-4922

The operator or owner shall be prepared to give the following information to the health officer as applicable to the conditions:

a. The minimum free chlorine residual measured.
b. Time and duration of loss of disinfection.
c. The maximum effluent uranium concentration.
d. Time and duration of loss of uranium removal treatment.
e. Type of pretreatment.
f. An explanation why the Emergency Response/Disinfection Plan did not prevent the problem.

2. At the direction of the Health Department, water plant operators shall post signs stating contamination of water system.

3. At the direction of the Health Department, the employees and residents shall be instructed not to use the water for drinking or hand washing until a certified operator has corrected the alarm condition.

4. At the direction of the Health Department, issue an order to truck in potable water for temporary operation.

5. At direction of the Health Department shut down the water system.

IV. OPERATING PERSONNEL AND EMERGENCY CONTACTS

A copy of the Water Quality Emergency Notification Plan Form appears in APPENDIX I.

San Diego Public Works Department

Milica Kaludjerski	Jim LeSire	Kyehee Kim	Daniel Brogadir
858-694-2718	619-204-1569	858-694-3921	858-694-2714

County Water System and Plant Operators

Ron Basil
California Licensed Operator T1 #25825, D1 #16779
619-660-2008
858-204-1648

James LeSire
California Licensed Operator T2 #8960, D1 #16845
619-660-2008
858-204-1569

Contract Treatment Plant Operators
Rocky Vandergriff

California Licensed Operator T3 #2521
760-427-4235

Department of Public Health, Drinking Water Field Operations San Diego Branch
Sean Sterchi
District Engineer
619-525-4922

San Diego County Office of Emergency Services
858-565-3490

Sybron Chemical Inc. – Resin Manufacturer

Dan Schroendorf	Dave Dally
360-834-0701	609-893-11 ex. 382

Envirogen Technologies – Radiation Removal Company
Todd Webster
877-312-8950 (ext. 295)
The Owner is in the process of acquiring a new contract for radiation removal service. Upon initiating a new contract, the Owner will report to the California Department of Public Health, Drinking Water Field Operations San Diego Branch.

Los Angeles Chemical Company
1-800-348-0034
760-352-5300

Thatcher Chemical
Moses Ortega 760-344-5464
Robert Perez 760-352 3749

V. PERFORMANCE MONITORING AND RELIABILITY FEATURES

A. Constituents Continuously Monitored

1. Treated-Water Turbidity .....Continuous Turbidimeter w/ Chart Recorder
2. Free Chlorine Residual .....Continuous Chlorine Analyzer w/ Chart Recorder.
3. Treated-Water Flow Rate.....Flow Meter
4. Total Plant Operation Time .....Hour Meter

B. Alternative/Other Monitoring (performed by operator during site visit)

1. pH.....Grab sample: ion exchange effluent
2. Stored Water Temperature.....Grab sample: ion exchange effluent
3. Coliform Bacteria.....Grab sample taken to Certified Lab, Monthly
4. Raw-Water Turbidity.....Hand-held Turbidimeter
5. Treated-Water Turbidity.....Hand-held Turbidimeter
6. Free Chlorine Residual .....Grab sample: filter effluent, Tank No. 2 effluent

7. Raw-Water Radiological……Grab sample at water wells taken to Certified Lab, Quarterly
8. Treated-Water Radiological……...Grab sample at ion exchange effluent taken to Certified Lab, Monthly

C. Alarm and Automatic Shutdown Capabilities

Plant automated monitoring devices will trigger an alarm condition if certain water quality parameters are not maintained. Under an alarm condition the plant has the ability to:

1. Illuminate a visual alarm (exterior building light)
2. Sound an audible alarm siren.
3. Shutdown the plant (stops plant from treating water and automatically notifies operating personnel via an auto-dialer)

NOTE: The automated monitoring equipment alarm features need to be exercised and recorded monthly to insure reliable operation.

Below is a summary of the Plant alarm set-points and resulting actions:

1. Treated-Water Turbidity > .3 NTU* .....Visual Alarm and Shutdown
2. Free Chlorine Residual Tank No. 2 Effluent < 0.75 ppm*…..VisualAlarm, Dialer and Shutdown
3. Chlorine Chemical Feed Pressure Loss* .....Visual Alarm and Shutdown
4. Flocculent Chemical Feed Pressure Loss* .....Visual Alarm and Shutdown
5. Polyphosphate Chemical Feed Pressure Loss*....Visual Alarm and Shutdown
6. Orthophosphate Chemical Feed Pressure Loss*..Visual Alarm and Shutdown
7. Supply Water Pressure Loss .....Visual Alarm and Shutdown
8. Low Level Float Switch in Storage Tank .....Disables Distribution Pumps

* Under these alarm conditions the plant will automatically dial the operator.

D. Frequency

1. Licensed operator is to visit plant minimum of 1 times a week.
2. Continuous treated water turbidimeter alarms-out after 5 minutes above 0.3 NTU.
3. Chlorine Analyzer continuously monitors free chlorine residual at filter effluent.
4. Coliform Bacteria Samples of treated water to be collected and tested as required in the "Sample Siting Plan". See APPENDIX F for sampling site.
    a. Test results to be submitted to DHS by the tenth of the month along with the Surface Water Treatment Rules monthly summary.
5. Raw water turbidity, pH and stored water temperature checked during each site visit by the operator.
6. Clearwell is to be inspected annually and cleaned as needed. See Preventative Maintenance section in *EQUIPMENT MAINTENANCE PROGRAM*.
7. The Campo Hills Water System is to perform quarterly radiological raw water monitoring from each well in use and monthly treated water effluent from the ion exchange units.

E. Chlorine Contact Time

1. Refer to Table E-3 through E-6 for CT values and ratios in APPENDIX J.
2. CT calculation based on actual conditions for the required log reduction.
3. A schematic of the unit process and chlorine feed points is in APPENDIX B.

F. Plant Requirements

1. A State of California Grade II Operator (minimum) must operate plant.
2. Plant shall be operated in accordance with this Operations Plan as approved by the San Diego County Department of Environmental Health Services.
3. Water delivered by the plant shall be free from coliform bacteria at all times.
4. Chlorine residual shall be maintained between 0.75 and 1 mg/L. With appropriate alarm settings on Continuous Chlorine Analyzer.
5. The turbidity level of the filtered water shall be as follows:
    a. Design goal of 0.2 NTU.*
    b. Equal to or less than 0.3 NTU in 95% of measurements taken each month.*
    c. Shall not exceed 5.0 NTU at any time.*
    d. Maximum acceptable turbidity for normal operations is 0.3 NTU.*

        *See Emergency Response Plan Section B on Page 11, if turbidity fails to meet these levels.
    e. The free chlorine residual of the treated water shall be greater than 0.75 mg/L at all times.*

        *See Emergency Response Plan Section B on Page 10, if chlorine residual fails to meet these levels.

G. Instrument Calibration Schedule

1. Check plant alarms monthly and record in monitoring log.
2. Chlorine Analyzer, Turbidimeter and all other monitoring equipment, (continuous and manual), are to be calibrated quarterly and recorded in the monitoring log, see APPENDIX K. Calibrate according to manufacturer's specifications located in APPENDIX H.

VI. CHEMICAL DOSAGE RATES

A. Chemical Feed Rate Procedures

1. A pilot plant has been used for determining the best concentration for the coagulant aid, phosphate agents for iron/manganese control, and corrosion control and the disinfectant. These initial dosages are to be adjusted by the operator to meet the actual conditions throughout operation.
    a. T Flock IFD 201 is to be dosed at approximately 12 to 16 mg/L if coagulation process is necessary.
    b. Both polyphosphate and orthophosphate agents are to be dosed to reach approximately 1mg/L.
    c. Sodium hypochlorite is to be dosed at approximately 0.75-1.0 ppm.

B. Water Quality Parameters

1. Raw water ..... 1 - 15NTU (maximum)
2. pH..... 6.8 to 7.2
3. Temp. ..... 50 to 80 degrees Fahrenheit
4. Chlorine..... 0.75 mg/L.
5. Treated water turbidity..... 0.2 NTU (treated-water design goal)

C. List of Chemical Used

1. 12.5% solution of Sodium Hypochlorite in 55-gallon drums.
2. Primary Coagulant Aid (T Flock IFD 201) in 55-gallon drums
3. Orthophosphate (CP-35) and Polyphosphate (CP-37) in 55-gallon drums.

VII. EQUIPMENT MAINTENANCE PROGRAM

A set of PV-150 "as-built" drawings as well as a schedule of materials appears in APPENDIX C.

A. Equipment Suppliers

1. Continuous treated water turbidity monitoring with HF Scientific.
   a. Microitol Turbidity Analyzer
   b. (Set system shut-down @ 1.0 NTU max.)

   USA Blue Book.

2. Continuous chlorine monitoring with HACH Instruments Analyzer.
   a. Model CL-17 Free Chlorine Analyzer
   b. (Set system shut-down @ 0.75 mg/L min. at clearwell effluent)

   HACH CO.
   P.O. Box 389
   Loveland, CO 80539
   Telephone (800) 227-4224

3. Continuous flow, chlorine and treated water turbidity, recorded with Honeywell Chart Recorders.
   Model DR4300 (4302-0000-B0100-0000-0000-U000)

   George T. Hall Co.
   4289 Taylor St.
   San Diego, CA 92110
   Telephone (619) 2974671

4. Liquid Chlorine, Flocculent, and Phosphate agents injected by LMI chemical feed pumps.
   Stock # RPM 352/258

   CT Wingert Co.

11800 Monarch St.
Garden Grove, CA 92841
Telephone (714) 379-5519
FAX (714) 379-5549
Account # 8001

5. Manual pH testing with Oaktron pH Testor
   a. PHTester3+ (Stock # 51750)
   b. Electrode (Stock # 51751)

   USA Bluebook
   P.O. Box 9004
   Gurnee, IL 60031
   Telephone (800) 548-1234

6. Emergency auto-dialing with a Security Auto-Dialer by Radio Shack

   CAT # 49-434B
   200 Taylor Street, Suite 600
   Ft. Worth, TX 76102
   Telephone (817) 415-3200
   Fax (817) 415-3240

7. AWWA and NSF certified Dual-media filter media from George L. Throop Co.

   George L. Throop Co.
   444 N. Fair Oaks Ave.
   P.O. Box 92405
   Pasadena, CA 91109-2405
   Telephone (800) 796-0285
   Telephone (626) 796-0285
   Fax (626) 577-0023

B. Chemical Suppliers

1. Coagulant Aid

   T Flock IFD 201 in 55-gal drums

   Thatcher Chemical Co.
   233 S Seventh Ave
   la Puente, CA 91746-3214
   (626) 961-0351
   1-800 348-0034

2. Disinfectant
   Sodium Hypochlorite

   Thatcher Chemical Co.
   233 S Seventh Ave

la Puente, CA 91746-3214
(626) 961-0351
1-800 348-0034

3. Polyphosphate Agents (CP-37) / Orthophosphate Agents (CP-35)

   Sterling Water Technologies, LLC
   P.O. Box 602
   Columbia, TN 38402-0602
   (931) 540-1334
   1-800 426-2428

4. Chemicals for HACH Instruments

   Model CL-17 Free Chlorine Analyzer
   Change each month, order 6 months at a time ± $376.20 per year

Free chlorine Indicator solution	@ $11.70	cat # 23140-11
Free chlorine buffer solution	@ $10.40	cat # 23141-11
DPD powder	@ $11.40	cat # 22972-55
All three (3) in a set	*@ $31.35*	*cat # 25569-00*

   HACH CO
   P. O. Box 608
   Loveland, Colorado 80539
   Telephone (800) 227-4224
   FAX (970) 669-2932

C. Preventative Maintenance

It is the responsibility of the San Diego Public Works Department to maintain the water treatment plant. Routine maintenance and repair as well as upgrades and modifications are to be completed by the water plant operator(s). Extra parts and equipment are to be kept on site at all times to insure prompt repairs. If a particular piece of equipment needs to be ordered, see equipment vendors' contact information, Section A (above).

The following list describes mandatory routine maintenance for the Plant:

1. All equipment, pumps, chemical feed pumps, chlorinator, pipe and tubing are regularly inspected, replaced, or repaired as needed.
2. To insure that the alarm and shutdown systems are functional at all times, these features shall be field-tested and recorded at least once per month.
3. Treated water storage tanks need to be inspected regularly and cleaned as needed. The sediment shall be drained every *four months* by opening the gate valve located at the base of the storage tank. The water shall be discharged for at least *two full minutes* or until the water is clear and free of visible particles which ever is

longer. If the flushing takes more than *fifteen minutes*, then the storage tank shall be drained and cleaned in accordance with AWWA Standard C652-92.

a. Storage tank cleaning methods:
   (1) Tank cleaning off-line:
      (a) Isolate storage tank
      (b) Set-up temporary potable water supply for distribution system.
      (c) Drain, clean and flush storage tank.
      (d) Disinfect with 12.5% liquid chlorine at 1.5 to 2 mg/L. (approximately 0.5 liter of 12.5% solution in 5,000 gallons.)
   (2) Tank cleaning on-line:
      (a) Using self-priming centrifugal pump with clean/sterile suction hose, gently suck up foreign debris inside storage tank until clean.

2. Extra parts and equipment kept on site:
   a. Spare parts to rebuild LMI chemical feed pump, (poppets, check valves, and o-rings).
   b. Liquid chlorine kept on hand in 1 gallon bottles.
   c. Liquid alum / polymer mix.
   d. Liquid phosphate agents.
   e. All monitoring equipment chemicals and supplies.
3. Procedures for Equipment Failure:
   a. Immediately replace effected component with backup unit.
   b. Repair component with spare parts and return component to service.
   c. Order replacement parts immediately.

VIII. DESCRIPTION OF LABORATORY PROCEDURES

Treated water and raw water are both tested by a certified contract laboratory. The contract laboratory is to report water quality results to the CDHS using Electronic Data Transfer (EDT) using the Primary Station Code (PS_Code).
The Contract Laboratory for the Campo Hills Water Treatment Plant is Test America, Irvine, CA (Phone: 949-261-1022).

IX. DESCRIPTION OF RECORDS

A. Monitoring results

1. Bacteriological samples (Bac-T), are taken according to the schedule dictated by Bacteriological Sample Siting Plan as shown in APPENDIX F.

2. A sample ***SURFACE WATER TREATMENT REGULATIONS MONTHLY MONITORING***

SUMMARY FORM appears in APPENDIX K.

3. A sample ***DAILY MONITORING LOG*** of the water plant's activity and performance appears in APPENDIX K.

4. Quarterly radiological raw water monitoring from the respective wells in use and monthly treated water effluent from the ion exchange system will be performed and the chemical analysis of the samples shall be done and reported by a state-certified laboratory.

B. Records, Rates, and Logs

1. Daily monitoring log kept on site (sample log attached, see APPENDIX K).
2. Monthly monitoring records kept on site (sample recording sheet attached, see APPENDIX K).
3. Continuous chart recording treated water turbidity.
4. Continuous chart recording of chlorine residual level and flow.
5. Licensed operator is to visit and inspect Plant minimum of 1 time a week.
6. To insure that the alarm and shutdown systems are functional at all times, these features shall be field-tested at least once per month and recorded.
7. Records submitted monthly to San Diego District Office of Department of Health Services, Drinking Water Field Operations Branch.

X. COMPLIANCE IMFORMATION

All state forms, and NSF approval letters appear in APPENDIX D.

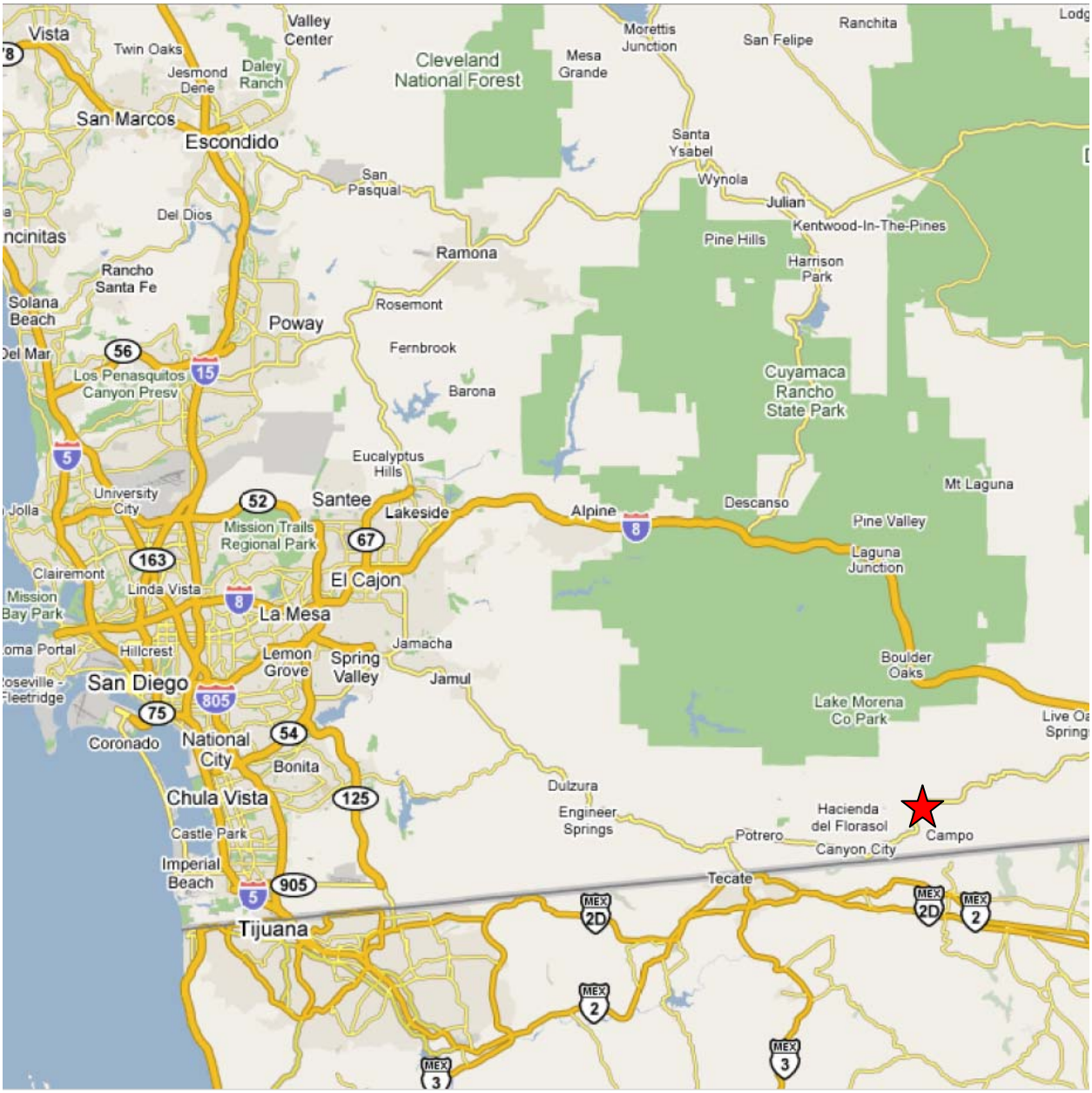
XI. INTERCONNECT WITH RANCHO DEL CAMPO WATER SYSTEM

Water service for the Campo community is provided via two separate drinking water systems – Rancho Del Campo (ID: 3700859) and Campo Hills (ID: 3710047). Rancho Del Campo Water System serves approximately 110 connections including residential, commercial, and public agency customers in old Campo Area. There is a manual interconnect between two system which shall be used in the emergency only. The interconnect is located at the intersection of White Sage Trail and Sheridan Road and is an above-ground facility consisting of a booster pump and a pressure reducing valve. The interconnect is normally closed through an isolation valve in the street because water would freeze in the aboveground pipes in the winter. In November 2008, Rancho Del Campo Water System experienced water quality problem, and in response, an emergency connection with Campo Hills Water System was temporarily activated. The valve located within the interconnect facility was manually controlled to transfer the water from Campo Hills storage tank (elev=2832 ft ±) to Rancho Del Campo storage tanks (elev=2758ft±) by gravity. The interconnect has not been used for the reverse flow direction from

Rancho Del Campo to Campo Hills storage tank; however a booster pump with a maximum capacity of 111 gpm at 210 ft TDH enables water to move from Rancho Del Campo to Campo Hills. Since there is no automatic control, a close attention has to be maintained to water levels in both systems to prevent drawing down either too far or overflowing either set of storage tanks. In case of emergency interconnect occurrence, the California Department of Public Health and the County Environmental Health shall be contacted for the required approval for the procedure. Site map for two water systems and a location of the interconnect facility appear in APPENDIX L.

APPENDIX A

CAMPO HILLS WATER SYSTEM VICINITY MAP



★ **Campo Hills Water System**

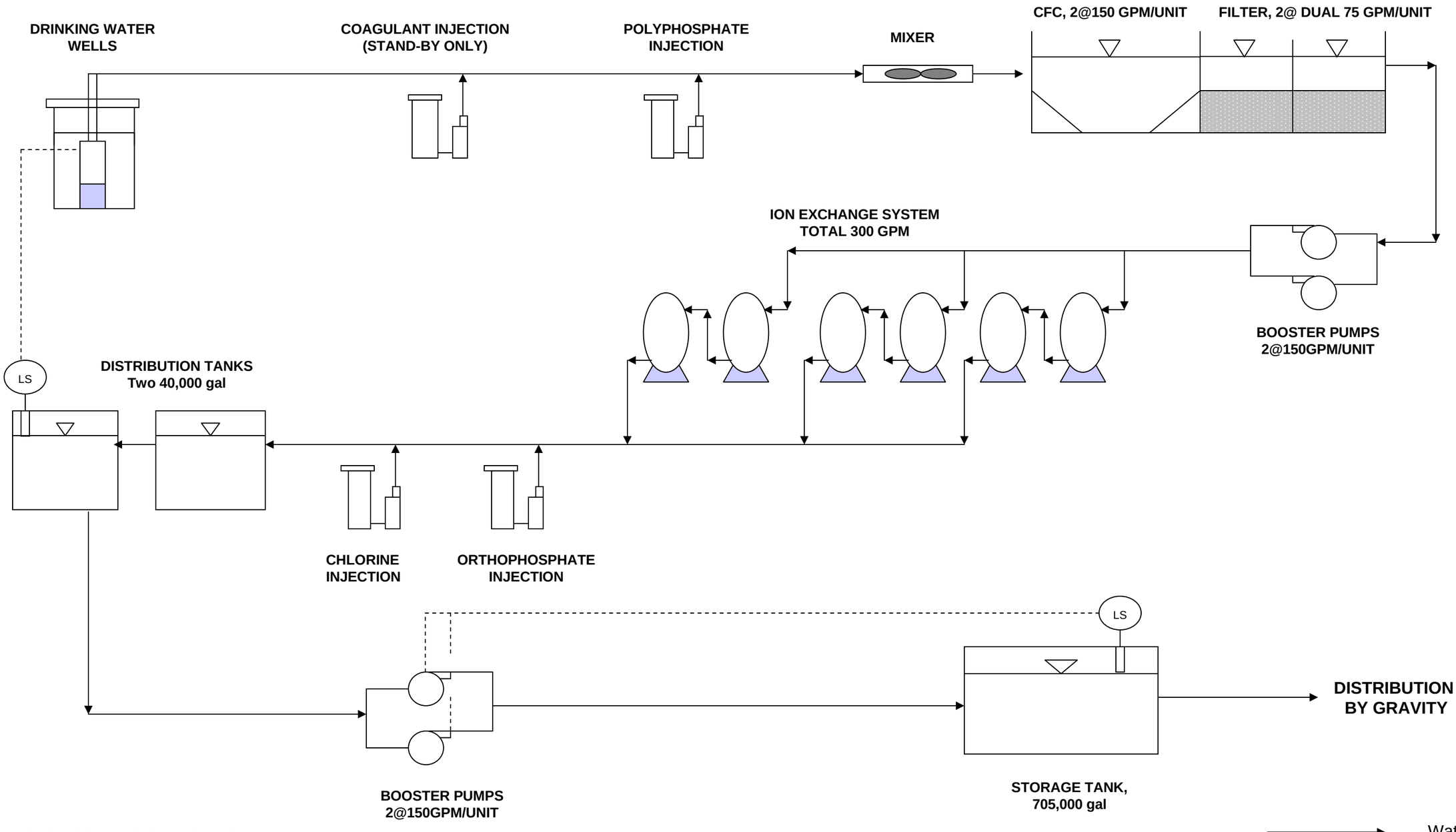
CAMPO HILLS WATER SYSTEM
VICINITY MAP
(not to scale)

North

APPENDIX B

CAMPO HILLS WATER SYSTEM PROCESS SCHEMATIC

PROCESS FLOW DIAGRAM FOR CAMPO HILLS WATER TREATMENT PLANT



CFC: Coagulation/Flocculation Chamber

LS: Level Switch

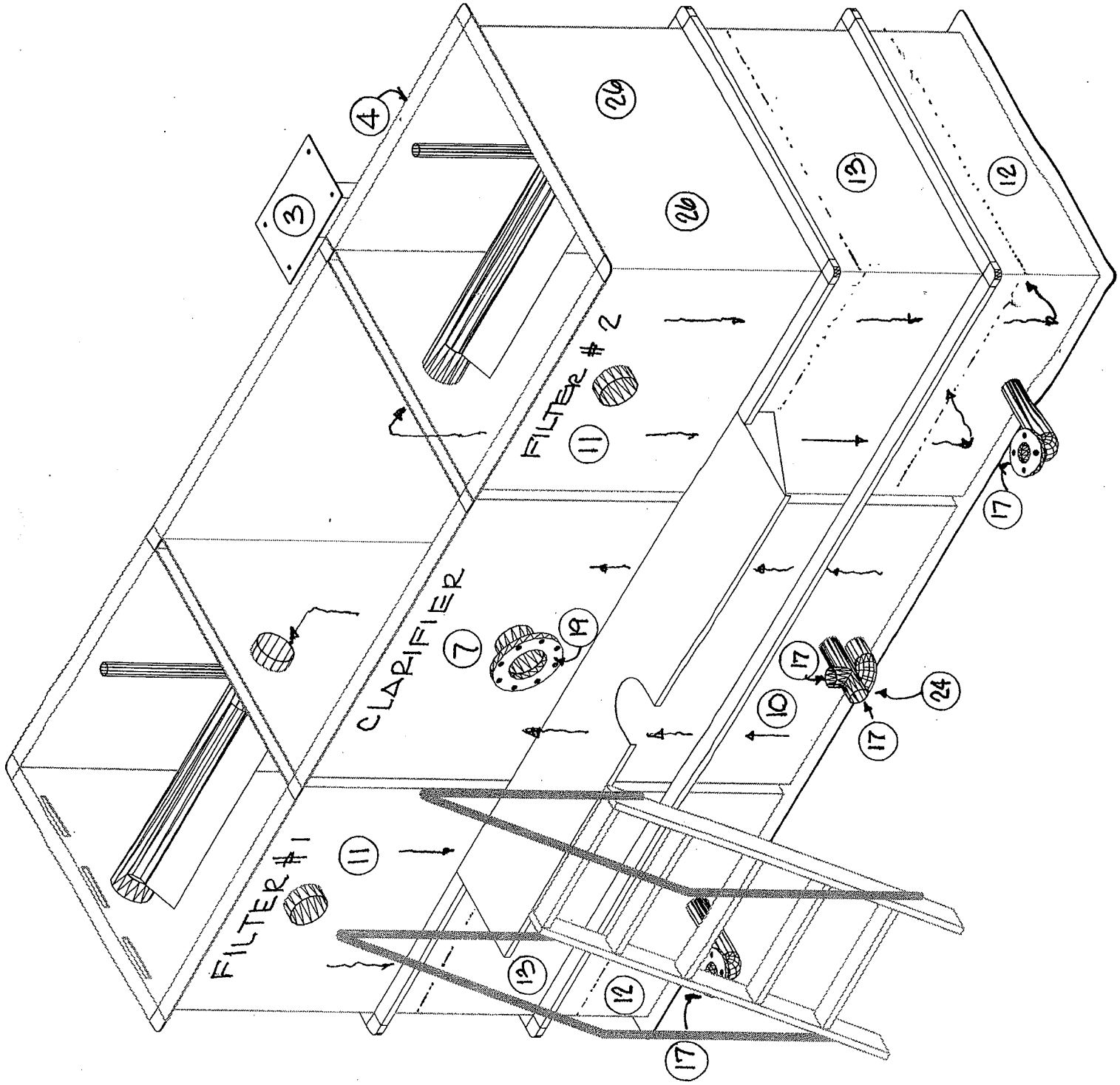
Water Pipe

Control Cable

APPENDIX C

PV-150 “AS-BUILT” DRAWINGS

PV-150 SCHEDULE OF MATERIALS


4
3
20
26
13
12
FILTER #2
11
17
CLARIFIER
7
19
17
24
10
17
FILTER #1
11
13
12
17

SEP 0 7 2004

PV-150 Water Treatment Plant

Treatment Plant Component Specifications

1. ONE - 700,000-gal TREATED-WATER, STORAGE TANK
2. POWDER COATED BOLTED STEEL W/ 20"ϕ VENTS & 24" ϕ MANWAY
3. ONE – 7.5 hp AIR SCOUR BLOWER, (70-cfm @ 3 ½-psi)
4. ONE – 5 hp FILTRATE PUMP (MONARCH INDUSTRIES BSE-200)
5. 160-gpm @ 45 ft. HEAD, CENTRIFUGAL PUMP 220 V - 1ϕ
6. Three 15 HORSEPOWER WELL PUMPS @ AT THREE LOCATIONS (BY OTHERS)
7. ONE – 19 ⌀' UP-FLOW COAGULATION / FLOCCULATION CHAMBER
8. MAXIMUM CLARIFICATION RATE = 7.9-gpm / ⌀' = 150-gpm
9. RINSE RATE = 18-gpm / ⌀' WHILE AIR SCOURING = 300-gpm w/ 50-cfm AIR
10. 42" DEPTH OF 2 mm to 3 mm NON-BUOYANT MEDIA
11. TWO – 15 ⌀' DUAL MEDIA / DOWN FLOW FILTERS
12. 12" DEPTH OF 0.4 TO 0.5 mm SILICA FILTER SAND MEDIA
13. 24" DEPTH OF 0.8 mm TO 0.9 mm ANTHRACITE MEDIA
14. FILTER AREA = 15 ⌀' ea.
15. FILTER RATE = 5-gpm / ⌀' = 75-gpm each = 150-gpm total
16. BACKWASH RATE = 20-gpm / ⌀' = 300-gpm
17. 3" ϕ ELECTRIC VALVE WITH MANUAL OVERRIDE
18. 3" ϕ ELECTRIC VALVE WITH MANUAL OVERRIDE
19. 6" ϕ ELECTRIC VALVE WITH MANUAL OVERRIDE
20. 3" ϕ BALL VALVE
21. 4" ϕ BALL VALVE
22. 3" ϕ CHECK VALVE
23. 4" ϕ CHECK VALVE
24. LMI 18-gpd CHEMICAL FEED PUMP WITH DISABLING SWITCH AND ALARM, DRAWS NEAT SOLUTION DIRECT FROM 55-gal DRUM.
25. LMI 18-gpd CHEMICAL FEED PUMP WITH DISABLING SWITCH AND ALARM, DRAWS NEAT SOLUTION DIRECT FROM 55-gal DRUM. DISABLING SWITCH AND AUDIO ALARM
26. CONTINUOUS TURBIDIMETER AND CHLORINE ANALYZER WITH SYSTEM SHUTDOWN.

Maximum Water Production	150-gpm = 180,000-GPD (20.0 hrs. W/ Backwash)
Treated Water Storage	700,000-gal above ground tank
Reserve Capacity	5 days.

APPENDIX D

FILTER MEDIA LETTERS OF NSF APPROVAL

NSF APPROVAL FOR CHEMICALS

MSDS SHEETS FOR CHEMICALS

RICHARD PATA ENGINEERING
272 CEDAR AVENUE EL CENTRO, CA 92243 richardpata@integrity.com PHONE 760-352-0386 FAX 760-352-7856

TRANSMITTAL

August 9, 2004

Toby Roy, PE
592 Ocean View Avenue
Encinitas, California 92024

Attention: Toby Roy

Telephone No. 760-436-2695

Project: Campo Hills, LLC Water Treatment Plant

Material Transmitted:

1. **Material Safety Data Sheet for Chemicals for water treatment Plant**
2. **NSF Certification for Chemicals**
3. **NSF Certification for filter Media and Clarifier Media**

Should you have any questions, please do not hesitate to call.

Respectfully submitted,

Richard Pata

CENTRALIA

Centralia Coal Sales Company

POST OFFICE BOX 478
WILKES BARRE, PA 18703-0478

Typical PHYSICAL & CHEMICAL CHARACTERISTICS of ANTHRAFILT
(other than size)

1. Apparent Specific Gravity Per ASTM C-128 - Mean: 1.65 (STD Deviation ± .05)
2. Hardness — 3.0 - 3.8 MOH Scale
3. Attrition Losses — Minimal
4. Shape Factor:

   $\left(\text{Sphericity} = \frac{\text{surface area of equivalent sphere}}{\text{surface area of irregular grain}}\right)$

   0.61 loosely packed
   0.60 tightly packed
5. Source of Material: PA Eastern Middle Field Mammouth Vein
6. Average Ultimate Analyses (moisture and ash-free basis)

B.T.U.	14,828
Nitrogen	0.8%
Hydrogen	2.1%
Carbon	84.7%
Oxygen	1.6%
Sulphur	0.8%
Ignition Point	950° F

7. Acid Solubility (per AWWA B100-89) Mean .67% SD ± .29 < 2%
8. Caustic Solubility (in 1% NaOH @ 190° F) Mean .70% SD ± .31 < 2%

570-822-4135
FAX 570-824-1884

ISO 9002 CERTIFIED

E-MAIL centralil@mail.microservo.net

NSF Product and Service Listings

These Listings were Last Updated on **Friday, February 27, 2004** at 4:15 AM Eastern Time. Please contact NSF International to confirm the status of any Listing, report errors, or make suggestions.

Warning: NSF is concerned about fraudulent downloading and manipulation of website text. If you have received this listing in hard copy, always confirm this certification/listing information by going directly to http://www.nsf.org/Certified/PwsComponents/Listings.asp?Company=58700&Standard=061& for the latest most accurate information.

NSF/ANSI STANDARD 61
Drinking Water System Components - Health Effects

NOTE: Unless otherwise indicated for Materials, Certification is only for the Water Contact Material shown in the Listing. Click here for a list of Abbreviations used in these Listings.

CARBON SALES, INC.
89-153 MILLER STREET
P.O. BOX 1600
WILKES-BARRE, PA 18705
717-823-7664

Facility : WILKES-BARRE, PA

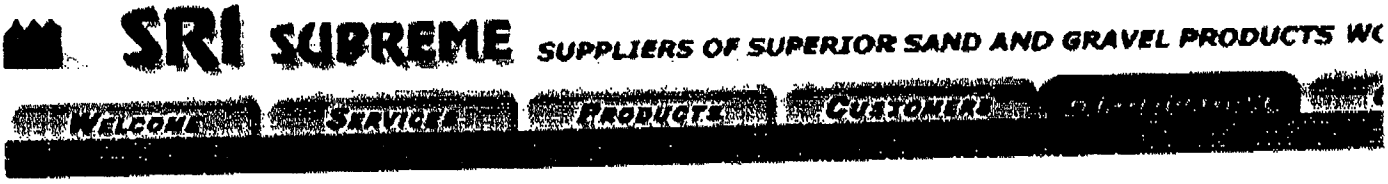
Process Media

Trade Designation	Size	Water Contact Temp	Water Contact Material
Anthracite			
Filter Anthracite	.3mm - 50mm[1]	CLD 23	NA
Anthrafilt	.3mm - 50mm[1]	CLD 23	NA

[1] All gradations.

NOTE: Certified for water treatment plant applications.
This product has not been evaluated for point of use applications.

Number of matching Manufacturers is 1
Number of matching Products is 2
Processing time was 0 seconds



Certifications...

NSF

Certified - National Sanitation Foundation

SRI products meet or exceed the NSF/ANSI Standard 61 for Drinking Water System Components.

Water Treatment Plants
Water Filtration
Well Packing
Septic Systems
Dewatering

National Sanitation Foundation

Certified - California Air Resourses Board

Certified Dried Sands

SRI Supreme #12
SRI Supreme #20
SRI Supreme #30

California Air Resourses Board

American Water Works Association

Member - A.W.W.A.

A.W.W.A. Service Provider Members are companies such as manufacturers, distributors, and consulting firms that service the drinking water industry.

Research and development have enabled SRI to produce effective sizes and uniformity coefficients recommended by the American Water Works Association.

American Water Works Association

USGA.

United States Golf Association

Washed in accordance to U.S.G.A. specifications. Excellent stability for steep bunker faces allowing for easier and lowe maintenance costs. Free of silt and clay allowing for proper drainage.

U.S.G.A. Bunker Sand
U.S.G.A. Rootzone/Top Dressing
Davis Specifications
Sand/Peat Blends 90:10, 80:20, 70:30

United States Golf Association

NSF Product and Service Listings

These NSF Official Listings are current as of **Tuesday, September 21, 2010** at 12:15 a.m. Eastern Time. Please contact NSF International to confirm the status of any Listing, report errors, or make suggestions.

Alert: NSF is concerned about fraudulent downloading and manipulation of website text. Always confirm this information by clicking on the below link for the most accurate information:
http://www.nsf.org/Certified/PwsChemicals/Listings.asp?CompanyName=Sterl&

NSF/ANSI STANDARD 60
Drinking Water Treatment Chemicals - Health Effects

Sterling Water Technologies, LLC

114 West 7th
Suite 3
Columbia, TN 38401
United States
800-426-2428

Facility : # 2 USA

Poly (Diallyldimethylammonium Chloride)(pDADMAC)[PD]

Trade Designation	*Product Function*	*Max Use*
SW102	Coagulation & Flocculation	50mg/L
SW102HV	Coagulation & Flocculation	50mg/L
SW102VHV	Coagulation & Flocculation	50mg/L
SW102XHV	Coagulation & Flocculation	50mg/L
SW102XXHV	Coagulation & Flocculation	50mg/L
SW104	Coagulation & Flocculation	25mg/L
SW104HV	Coagulation & Flocculation	25mg/L
SW135VHV	Coagulation & Flocculation	29mg/L
SW135VLV	Coagulation & Flocculation	29mg/L

[PD] Certification is based on a maximum carryover of 50 ug/L DADMAC polymer.

Polyamines[PY]

Trade Designation	*Product Function*	*Max Use*

SWT 9302B	Coagulation & Flocculation	250mg/L
SWT 9302BS	Coagulation & Flocculation	250mg/L
SWT 9302BSH	Coagulation & Flocculation	250mg/L
SWT 9302S	Coagulation & Flocculation	250mg/L
SWT 9302SH	Coagulation & Flocculation	250mg/L
SWT 9305	Coagulation & Flocculation	167mg/L
SWT 9305A	Coagulation & Flocculation	167mg/L
SWT 9305B	Coagulation & Flocculation	167mg/L
SWT 9306	Coagulation & Flocculation	125mg/L
SWT 9306A	Coagulation & Flocculation	125mg/L
SWT 9306B	Coagulation & Flocculation	125mg/L
SWT 9308	Coagulation & Flocculation	100mg/L
SWT 9308A	Coagulation & Flocculation	100mg/L
SWT 9308B	Coagulation & Flocculation	100mg/L
SWT 9309	Coagulation & Flocculation	83mg/L
SWT 9309A	Coagulation & Flocculation	83mg/L
SWT 9309B	Coagulation & Flocculation	83mg/L
SWT 9310	Coagulation & Flocculation	71mg/L
SWT 9310A	Coagulation & Flocculation	71mg/L
SWT 9310B	Coagulation & Flocculation	71mg/L
SWT 9311	Coagulation & Flocculation	50mg/L
SWT 9311A	Coagulation & Flocculation	50mg/L
SWT 9311B	Coagulation & Flocculation	50mg/L
SWT 9312	Coagulation & Flocculation	62mg/L
SWT 9312A	Coagulation & Flocculation	62mg/L
SWT 9312B	Coagulation & Flocculation	62mg/L
SWT 9314	Coagulation & Flocculation	56mg/L
SWT 9314A	Coagulation & Flocculation	56mg/L
SWT 9314B	Coagulation & Flocculation	56mg/L

```
[AL] Based on an evaluation of health effects data, the level of aluminum in the finished
     drinking water shall not exceed 2 mg/L.
[PD] Certification is based on a maximum carryover of 50 ug/L DADMAC polymer.
[PY] Polyamines Certified by NSF International comply with 40 CFR 141.111 requirements for
     percent monomer and dose.
```

Sterling Water Technologies, LLC

P.O. Box 602
Columbia, TN 38402-0602
United States
800-426-2428
931-540-1334
Visit this company's website

Facility : # 4 USA

CP 11	Corrosion & Scale Control	16mg/L
CP 11(S)	Corrosion & Scale Control	16mg/L
CP 12	Corrosion & Scale Control	15mg/L
CP 12(S)	Corrosion & Scale Control	15mg/L
CP 155	Corrosion & Scale Control	12mg/L
CP 1785	Corrosion & Scale Control	23mg/L
CP 21	Corrosion & Scale Control	8mg/L
CP 241	Corrosion & Scale Control	8mg/L
CP 279	Corrosion & Scale Control	6mg/L
CP 291	Corrosion & Scale Control	6mg/L
CP 785	Corrosion & Scale Control	23mg/L
CP 785(S)	Corrosion & Scale Control	23mg/L
CP 790	Corrosion & Scale Control	23mg/L
CP 790(S)	Corrosion & Scale Control	23mg/L
S 444	Corrosion & Scale Control	7mg/L

[ZN] Based on an evaluation of health effects data, the level of zinc in the finished drinking water shall not exceed 2.0 mg/L.

Monosodium Orthophosphate

Trade Designation	*Product Function*	*Max Use*
CP 25	Corrosion & Scale Control	30mg/L
CP 35	Corrosion & Scale Control	20mg/L
CP 78D	Corrosion & Scale Control	13mg/L

Phosphoric Acid

Trade Designation	*Product Function*	*Max Use*
CP 36	Corrosion & Scale Control	20mg/L
CP 36 Food Grade	Corrosion & Scale Control	20mg/L
CP 70	Corrosion & Scale Control	12mg/L
CP 70 Food Grade	Corrosion & Scale Control	12mg/L
CP 80	Corrosion & Scale Control	12mg/L
CP 80 Food Grade	Corrosion & Scale Control	12mg/L

Sodium Polyphosphates, Glassy

Trade Designation	*Product Function*	*Max Use*
CP 37	Corrosion & Scale Control	24mg/L
CP 65D	Corrosion & Scale Control	11mg/L
CP 733	Corrosion & Scale Control	24mg/L

Tetrapotassium Pyrophosphate

Trade Designation	*Product Function*	*Max Use*
CP 17	Corrosion & Scale Control	54mg/L
CP 34	Corrosion & Scale Control	27mg/L
CP 38	Corrosion & Scale Control	27mg/L

Zinc Chloride[ZN]

Trade Designation	*Product Function*	*Max Use*
CP 30	Corrosion & Scale Control	6mg/L

THATCHER COMPANY MATERIAL SAFETY DATA SHEET
PRODUCT: T-CHLOR

MSDS Date: November 5, 1998
Emergency Contact: 1-800-424-9300

SECTION I

PRODUCT NAME: T-Chlor
CHEMICAL NAME: Sodium Hypochlorite Solution **Formula:** NaOCl solution
CHEMICAL FAMILY: Hypochlorite **MOLECULAR WEIGHT:** 74.44

DOT SHIPPING INFORMATION: Hypochlorite Solution, 8, UN 1791, PG III

SECTION II - HAZARDOUS INGREDIENTS

This material contains no ingredients which are known by Thatcher Company to be hazardous unless listed below.

HAZARDOUS MATERIAL	CAS NUMBER	w/w %	EXPOSURE LIMITS IN AIR
Sodium Hypochlorite	7681-52-9	11 - 15	None Determined

The specific identity of some ingredients may be withheld for confidential business purposes. However, all known potential health effects from exposure to these ingredients are being addressed.

SECTION III - HEALTH HAZARD DATA

NFPA HAZARDOUS RATING: Health = 2 Flammability = 0 Reactivity = 0

CARCINOGENIC LISTING:

NTP: No ingredients listed in this section.

IARC MONOGRAPHS: No ingredients listed in this section.

OSHA 29 CFR 1910: No ingredients listed in this section

ENTRY ROUTES & EFFECTS OF OVEREXPOSURE:

Contact: Corrosive. May cause severe skin and eye irritation or chemical burns to broken skin. Causes eye damage.
Inhalation: Can be irritating to lungs and mucous membranes.
Ingestion: Can cause nausea, irritation and possibly burns to the gastrointestinal tract.

STATEMENT OF PRACTICAL TREATMENT:

Contact: Flush exposed area thoroughly with water. For eyes, flush with cool water for at least 15 minutes and get prompt medical attention.
Inhalation: Remove person to fresh air.
Ingestion: If swallowed, drink large quantities of water. **Do not** induce vomiting. **Do not** give vinegar or other acids. Get prompt medical attention.

SECTION IV - FIRE AND EXPLOSION DATA

FLASH POINT:
Nonflammable

FLAMMABLE LIMITS:
Lel: N/A Uel: N/A

EXTINGUISHING MEDIA:
Use any.

SPECIAL FIRE-FIGHTING PROCEDURES:
Self-contained breathing apparatus should be available.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
Under some conditions, T-Chlor could release chlorine gas and/or oxygen.

SECTION V - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:
None normally required.

VENTILATION:
Use adequate ventilation.

EYE PROTECTION:
Safety glasses or chemical goggles.

SKIN PROTECTION:
Wear rubber gloves.

OTHER PROTECTIVE EQUIPMENT:
As needed to avoid contact with skin and eyes.

SECTION VI - SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS:
Wash thoroughly after handling. Avoid breathing vapors. Vacate poorly ventilated areas as soon as possible. Do not return until strong odors have dissipated. Do not take internally. Open drums carefully.

SECTION VII - PHYSICAL DATA

BOILING POINT: approx. 212

SPECIFIC GRAVITY: 1.2

VAPOR PRESSURE (mm Hg): Essentially water

% VOLATILE, BY VOLUME: Unknown

VAPOR DENSITY (air = 1): Essentially water

EVAPORATION RATE: Unknown

SOLUBILITY IN WATER: Complete

APPEARANCE AND ODOR: Clear, greenish-yellow liquid with a chlorine odor.

SECTION VIII - REACTIVITY DATA

STABILITY: Stable

HAZARDOUS POLYMERIZATION:
Will not occur.

HAZARDOUS DECOMPOSITION PRODUCTS: Chlorine, oxygen.

SECTION IX - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL SPILLS OR LEAKS:
Ventilate the area. Wear necessary safety equipment. Flush small spills to the sewer with large amounts of water. For large spills, dike the liquid and recover it into drums. Flush the residue to the sewer with water. (Flush residue water to sewer ONLY if permitted by local laws).

WASTE DISPOSAL METHOD:
Waste sodium hypochlorite solution (with a pH > 12.5) is an EPA Hazardous waste (D002) due to corrosivity. Dispose of at an EPA hazardous waste disposal facility. Comply with all local, state and federal regulations.

ACGIH = American Conference of Governmental Industrial Hygienists
CL = Ceiling Level
IARC = International Agency for Research on Cancer: Monographs
OSHA = Occupational Safety and Health Administration
N/A = Not Applicable
NTP = National Toxicology Program: Annual Report on Carcinogens
PEL = Permissible Exposure Level (OSHA)
TLV = Threshold Limit Value (ACGIH)
TWA = Time Weighted Average over 8 Hours
STEL = Short Term Exposure Limit (ACGIH)
ND = Not Determined

This information is, to the best of our knowledge, accurate but may not be complete. THATCHER COMPANY furnishes this information in good faith, but without warranty, representation or guarantee of its accuracy, completeness, or reliability.

THATCHER COMPANY MATERIAL SAFETY DATA SHEET
PRODUCT: T-FLOC IFD-201

MSDS Date: August 20, 2001
Emergency Contact: 1-800-424-9300

SECTION I

PRODUCT NAME: T-Floc IFD-201
CHEMICAL NAME: Mixture

DOT SHIPPING INFORMATION*: Other Regulated Substance, Liquid, n.o.s (Aluminum Sulfate), 9, NA 3082, PG III
RQ = 5000 Lbs

* (Not required if less than 5000 lbs)

SECTION II - HAZARDOUS INGREDIENTS

This material contains no ingredients which are known by Thatcher Company to be hazardous unless listed below.

HAZARDOUS MATERIAL	CAS NUMBER	w/w %	EXPOSURE LIMITS IN AIR
Aluminum Sulfate	10043-01-3	------	None determined

The specific identity of some ingredients may be withheld for confidential business purposes. However, all known potential health effects from exposure to these ingredients are being addressed.

SECTION III - PHYSICAL DATA

BOILING POINT (F): Approx. 213

SPECIFIC GRAVITY: 1.24

VAPOR PRESSURE (mm Hg): Essentially water

% VOLATILE, BY VOLUME: 73%

VAPOR DENSITY (air = 1): Essentially water

EVAPORATION RATE: N/D

SOLUBILITY IN WATER: Complete

APPEARANCE AND ODOR: Colorless to light yellow solution with little odor.

SECTION IV - FIRE AND EXPLOSION DATA

FLASH POINT: Nonflammable

FLAMMABLE LIMITS: Lel: N/A Uel: N/A

EXTINGUISHING MEDIA: Use any.

SPECIAL FIRE-FIGHTING PROCEDURES: None.

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UNUSUAL FIRE AND EXPLOSION HAZARDS: None.

SECTION V - REACTIVITY DATA

STABILITY: Stable

HAZARDOUS POLYMERIZATION: Will not occur

CONDITIONS OR MATERIALS TO AVOID: None.

HAZARDOUS DECOMPOSITION PRODUCTS: None.

SECTION VI - HEALTH HAZARD DATA

Carcinogenic Listing

NTP: No ingredients listed in this section.

IARC MONOGRAPHS: No ingredients listed in this section.

OSHA 29 CFR 1910: No ingredients listed in this section

ENTRY ROUTES & EFFECTS OF OVEREXPOSURE:

Contact: Can cause severe irritation to the eyes. Skin contact can result in moderate discomfort and irritation.

Ingestion: Excessive amounts can produce general symptoms of nausea, including dizziness, abdominal cramps and vomiting.

STATEMENT OF PRACTICAL TREATMENT:

Contact: Wash exposed are thoroughly with soap and water. For eyes, flush with cool water for at least 15 minutes and obtain prompt medical attention.

Ingestion: If conscious, give several glasses of water of milk. **Do not** induce vomiting. Call a physician immediately.

SECTION VII - SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS:
Avoid contact with skin and eyes. Do not take internally. Wash thoroughly after handling. Store in a cool, dry area away from direct contact with other chemicals.

STEPS TO BE TAKEN IF MATERIAL SPILLS OR LEAKS:
Wear proper safety equipment. Dike the spill and recover as much as possible into drums. Flush residue to sewer with large amounts of water (ONLY if permitted by all applicable regulations)

WASTE DISPOSAL METHOD:

Not an EPA hazardous waste. Dispose of in landfill or other appropriate disposal facility. Comply with all local, State and Federal regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: None normally required.

VENTILATION: Maintain adequate ventilation.

EYE PROTECTION: Chemical goggles.

SKIN PROTECTION: Wear rubber gloves, long-sleeved shirt.

OTHER PROTECTIVE EQUIPMENT: As needed to prevent contact with eyes and skin.

ACGIH = American Conference of Governmental Industrial Hygienists
CL = Ceiling Level
IARC = International Agency for Research on Cancer: Monographs
OSHA = Occupational Safety and Health Administration
N/A = Not Applicable
NTP = National Toxicology Program: Annual Report on Carcinogens
PEL = Permissible Exposure Level (OSHA)
TLV = Threshold Limit Value (ACGIH)
TWA = Time Weighted Average over 8 Hours
STEL = Short Term Exposure Limit (ACGIH)
ND = Not Determined

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THATCHER COMPANY MATERIAL SAFETY DATA SHEET
PRODUCT: T-FLOC IFD-201

This information is, to the best of our knowledge, accurate but may not be complete. THATCHER COMPANY furnishes this information in good faith, but without warranty, representation or guarantee of its accuracy, completeness, or reliability.

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Underwriters Laboratories Inc.

FDPH.MH17003
Drinking Water Treatment Additives

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Drinking Water Treatment Additives

Guide Information

THATCHER CO
1905 FORTUNE RD
PO BOX 27407
SALT LAKE CITY, UT 84127 USA

MH17003

Plant at Salt Lake City, UT

Trade Dsg	Category	Max Use Level (mg/L)
Zinc Orthophosphate	Corrosion and Scale Control	20
TI-2903	Corrosion and Scale Control	28
TI-2904	Corrosion and Scale Control	33
TI-2906	Corrosion and Scale Control	29
TI-2907	Corrosion and Scale Control	15.5
TI-2908	Corrosion and Scale Control	28
TI-3019	Corrosion and Scale Control	15.5
TI-3020	Corrosion and Scale Control	16
TI-3021	Corrosion and Scale Control	28 mg/L
Ferric Chloride	Flocculation	100 mg/L
Sodium Aluminate	Flocculation	40 mg/L
Aluminum Sulfate	Flocculation	150 mg/L
T-Floc 2100	Flocculation	100 mg/L

Sodium Bisulfite	Chlorine Removal, Misc.	18 mg/L
Sodium Hypochlorite	Disinfection and Oxidation	80 mg/L
Chlorine	Disinfection and Oxidation	30 mg/L
T-Floc 1410	Coagulation and Flocculation	50
T-Floc 1417	Coagulation and Flocculation	100
T-Floc 1419	Coagulation and Flocculation	50
T-Floc 1420	Coagulation and Flocculation	25
T-Floc C-148	Coagulation and Flocculation	6.0 mg/L
T-Floc B-12-L	Coagulation and Flocculation	75 mg/L
T-Floc B-21-L	Coagulation and Flocculation	150 mg/L
T-Floc IFD-201	Coagulation and Flocculation	194 mg/L
T-Floc IFD-4211	Coagulation and Flocculation	139 mg/L
Aqua Ammonia-25%	Disinfection and Oxidation	40 mg/L
Aqua Ammonia-28%	Disinfection and Oxidation	35 mg/L
Hydrofluosilic Acid	Fluorodation	6.0

Plant at: Henderson, NV

Trade Dsg	Category	Max Use Level (mg/L)
Sodium Hypochlorite	Disinfection and Oxidation	80
Aluminum Sulfate	Coagulation and Flocculation	150
Zinc Orthophosphate	Corrosion and Scale Control	20

Plant at: Missoula, Montana

Trade Dsg	Category	Max Use Level (mg/L)
Aluminum Sulfate	Coagulation and Flocculation	150
TI-3021	Corrosion and Scale Control	28 mg/L

SEP 0 7 2004

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Technical Information Bulletin

Rev. 6/23/08

CP 35 Orthophosphate

- NSF/ANSI Std 60 Certified
- Reduces or eliminates the need for pH adjustment
- Excellent for lead corrosion control
- Effective against black water complaints
- Reduces overall treatment costs

Description

Sterling Water Technologies CP 35 is a liquid orthophosphate corrosion inhibitor used primarily in the protection of potable water distribution systems. CP 35 has been specifically formulated to provide excellent lead corrosion control and for a wide range of corrosion inhibition needs. When added to the water flow, CP 35 forms a stable, evenly distributed protective film on distribution piping and all surfaces.

Typical Properties

Appearance: Clear colorless liquid
% O-PO4: 34-36
Density:1.40 – 1.48
pH: 4.0 – 7.0
NSF/ANSI Std 60 MUL: 20.0 mg/L

Principal Uses

- General Corrosion Control
- Excellent Rapid Film Former on Multiple Surfaces
- Controls Soluble Lead
- Shows Ability to Sequester Manganese

Product Safety Information

CP 35 is an acidic material and caution should be taken to prevent ingestion, contact with skin and eyes. It is recommended that safety eye protection, gloves and other personal protection be worn when handling all chemicals.

Packaging and Shipping

CP 35 is available in:

- 30 gallon (350# net weight) N/R Poly Drums
- 55 gallon (650# net weight) N/R Poly Drums
- 275 gallon (3000# net weight N/R Totebins
- Bulk – Various Quantities

Storage and Handling

- Store in a cool, dry, well ventilated area away from incompatible materials.
- Keep containers closed when not in use.
- Do not reuse containers. Empty containers retain product residues which can be hazardous.

Consult the product MSDS for specific information regarding handling, storage, safety, and DOT description.

800.426.2428 Customer Service ▪ 931.540.1334 Phone ▪ 931.540.1338 Fax ▪ P.O. Box 602 ▪ Columbia, TN 38402-0602
www.sterlingwatertech.com

STERLING WATER TECHNOLOGIES LLC
MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: CP 35

Intended Use:

HMIS Hazard Ratings

Health	0
Fire	0
Reactivity	0

Manufacturer: Sterling Water Technologies LLC
114 W. Seventh Street, Suite 3
Columbia, TN 38401
Telephone: (800) 426-2428

Emergency Phone: **CHEMTREC: (800) 424-9300**

MSDS Date of Preparation: 08/09/07
Prepared by: Denese A. Deeds, CIH Industrial Health & Safety Consultants, Inc. Woodbridge, CT 203-929-3473

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS No.	Amount
Non-Hazardous Inorganic Phosphate	Proprietary	30-50%
Water	7732-18-5	50-70%

This product is not hazardous as defined in the OSHA Hazard Communication Standard 29CFR1910.1200 and WHMIS regulation.

3. HAZARDS IDENTIFICATION

This product is a clear, colorless liquid with a characteristic odor.

EMERGENCY OVERVIEW

CAUTION!

May cause mild eye irritation. May cause mild skin irritation on prolonged or repeated contact. Inhalation of mists may cause mild mucous membrane and respiratory irritation.

4. FIRST AID MEASURES

Eye: Immediately flush victim's eyes with large quantities of water, holding the eyelids apart. Get medical attention if irritation persists.
Skin: Wash skin thoroughly with soap and water. Get medical attention if irritation develops. Remove and launder clothing before re-use.
Ingestion: Do not induce vomiting. Rinse mouth with water and give one glass of water to drink. Never give anything by mouth to an unconscious or convulsing person. Get medical attention.
Inhalation: Remove victim to fresh air. If breathing is difficult or irritation persists, get medical attention**.**

5. FIRE FIGHTING MEASURES

Flashpoint: None
Flammable Limits: LEL: Not applicable **UEL**: Not applicable

Autoignition Temperature: None
Extinguishing Media: Use media appropriate for surrounding fire. Cool fire exposed containers and structures with water.
Unusual Fire or Explosion Hazards: None known.
Special Fire-Fighting Instructions: Firefighters should wear positive pressure self-contained breathing apparatus and full protective clothing.
Hazardous Combustion Products: Thermal decomposition may yield oxides of sodium and phosphorus.
Explosion Data (sensitivity to mechanical impact or static discharge): None known.

6. ACCIDENTAL RELEASE MEASURES

Evacuate spill area and keep unprotected personnel away. Wear appropriate protective clothing as described in Section 8. Dike and collect liquid or absorb with an inert absorbent and place in appropriate containers for disposal. Prevent spill from entering sewers and water courses. Report releases as required by local, state and federal authorities.

7. HANDLING AND STORAGE

Handling: Avoid contact with the eyes. Avoid prolonged or repeated skin contact. Avoid breathing mists or aerosols. Wear protective clothing and equipment as described in Section 8. Use with adequate ventilation. Wash thoroughly with soap and water after handling. Keep containers closed when not in use.

Do not reuse containers. Empty containers retain product residues can be hazardous. Follow all MSDS precautions when handling empty containers.

Storage: Store in a cool, dry, well ventilated area away from incompatible materials. Protect from physical damage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines:

Non-Hazardous Inorganic Phosphate	None Established

Engineering Controls: Use with adequate general or local exhaust ventilation to minimize exposure levels.
Respiratory Protection: In operations where exposure levels are excessive, a NIOSH approved respirator with dust/mist cartridges or supplied air respirator appropriate for the form and concentration of the contaminants should be used. Selection and use of respiratory equipment must be in accordance with OSHA 1910.134 and good industrial hygiene practice.
Skin Protection: Wear impervious gloves such as rubber or neoprene if needed to avoid prolonged skin contact.
Eye Protection: Safety glasses recommended.
Other: Long-sleeved clothing and long pants recommended to avoid prolonged skin contact. Suitable washing facilities should be available in the work area.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance And Odor: Clear, colorless liquid with a characteristic odor.

Physical State: Liquid	**Boiling Point:** >100°C
Vapor Density: Same as water	**Vapor Pressure:** Same as water

Solubility In Water: Soluble	**Evaporation Rate:** Same as water
Specific Gravity: 1.40-1.48	**pH:** 4-7
Melting Point: Not applicable	**Octanol/Water Coefficient:** Not determined
VOC Content: 0%	

10. STABILITY AND REACTIVITY

Stability: Stable under normal storage and handling conditions.
Incompatibility: None known.
Hazardous Decomposition Products: When heated to decomposition emits toxic oxides of sodium and phosphorus.
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

HEALTH HAZARDS:
Ingestion: Ingestion may cause mucous membrane and gastrointestinal irritation. May cause nausea, vomiting and diarrhea. Large amounts may cause decreased blood pressure, decreased heart rate and coma.
Inhalation: Inhalation of mists may cause mild irritation of the nose throat and upper respiratory tract.
Eye: May cause mild irritation with pain and tearing.
Skin: May cause mild irritation on prolonged or repeated contact.
Sensitization: This material is not known to cause sensitization.
Chronic: None known.
Carcinogenicity: None of the components is listed as a carcinogen or suspected carcinogen by IARC, NTP or OSHA.
Mutagenicity: None currently known.
Medical Conditions Aggravated by Exposure: Employees with pre-existing eye and respiratory disease may be at increased risk from exposure.

Acute Toxicity Values:
Inorganic Phosphate: LD50 oral rat 7100 mg/kg. LD50 dermal rabbit >7940 mg/kg.

12. ECOLOGICAL INFORMATION

No ecotoxicity data is available for the product.
Inorganic Phosphate: LC50 daphnia magnia >1000 mg/L/48 hr. LC50 rainbow trout 3200 mg/L/96 hr.

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with local, state and federal environmental regulations.

14. TRANSPORT INFORMATION

Dot Hazardous Materials Description:
Proper Shipping Name: Not Regulated
UN Number: None
Hazard Class/Packing Group: None
Labels Required: None

15. REGULATORY INFORMATION

CERCLA: Releases above the reportable quantity of 10,000 lbs must be reported to the National Response Center. Many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.

SARA Hazard Category (311/312): Not Hazardous

SARA 313: This product contains the following chemicals subject to Annual Release Reporting Requirements Under SARA Title III, Section 313 (40 CFR 372): None

EPA TSCA Inventory: All of the ingredients in this product are listed on the EPA TSCA Inventory.

CANADA:
This product has been classified under the CPR and this MSDS discloses information elements required by the CPR.
Canadian CEPA: All the components of this product are listed on the Canadian DSL.
Canadian WHMIS Classification: Not a controlled product.

16. OTHER INFORMATION

NFPA Rating: Health = 0 Fire = 0 Reactivity = 0
HMIS Rating: Health = 0 Fire = 0 Reactivity = 0

NOTICE

This above information is believed to be correct but does not propose to be all inclusive and shall be used only as a guide. Sterling Water Technologies LLC shall not be held liable for any damage resulting from handling or from contact with the above product. This information relates only to the product designated herein and does not relate to its use in combination with any other material or process.

Technical Information Bulletin

Rev. 6/23/08

CP 37 Polyphosphate

- NSF/ANSI STD 60 Certified
- Reduces or Eliminates the Need for pH Adjustment
- Reduces Overall Treatment Costs

Description

Sterling Water Technologies CP 37 is a liquid Polyphosphate scale and corrosion inhibitor used primarily in the protection of potable water distribution systems. CP 37 has been specifically formulated to provide excellent sequestering capabilities and for a wide range of general corrosion inhibition needs. When added to the water flow, CP 37 forms a stable, evenly distributed protective film on distribution piping and all surfaces.

Typical Properties

Appearance: Clear colorless liquid
% P-PO4: 36 - 38
Density: 1.36 – 1.44
pH: 4 - 7
Solubility: 100%
Crystallization Point: < 30 ° F
NSF/ANSI STD 60 MUL: 25.4 mg/L

Principal Uses

- Controls General Corrosion
- Sequesters Calcium, Iron & Manganese
- Prevents Scale Deposits

Product Safety Information

CP 37 is a non-hazardous material. However, caution should be taken to prevent ingestion, contact with skin and eyes. It is recommended that safety eye protection, gloves and other personal protection be worn when handling all chemicals.

Packaging and Shipping

CP 37 is available in:

- 30 gallon (350# net weight) N/R Poly Drums
- 55 gallon (640# net weight) N/R Poly Drums
- 275 gallon (3000# net weight N/R Totebins
- Bulk – Various Quantities

Storage and Handling

- Store in a cool, dry, well ventilated area away from incompatible materials.
- Keep containers closed when not in use.
- Do not reuse containers. Empty containers retain product residues which can be hazardous.

Consult the product MSDS for specific information regarding handling, storage, safety, and DOT description.

800.426.2428 Customer Service ▪ 931.540.1334 Phone ▪ 931.540.1338 Fax ▪ P.O. Box 602 ▪ Columbia, TN 38402-0602
www.sterlingwatertech.com

STERLING WATER TECHNOLOGIES LLC
MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: CP 37

Intended Use:

HMIS Hazard Ratings

Health	0
Fire	0
Reactivity	0

Manufacturer: Sterling Water Technologies LLC
114 W. Seventh Street, Suite 3
Columbia, TN 38401
Telephone: (800) 426-2428

Emergency Phone: **CHEMTREC: (800) 424-9300**

MSDS Date of Preparation: 08/11/07
Prepared by: Denese A. Deeds, CIH Industrial Health & Safety Consultants, Inc. Woodbridge, CT 203-929-3473

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS No.	Amount
Non-Hazardous Inorganic Phosphates	Proprietary	40-60%
Water	7732-18-5	40-60%

3. HAZARDS IDENTIFICATION

This product is a clear to slightly turbid, viscous, opaque liquid with a characteristic odor.

EMERGENCY OVERVIEW

CAUTION!

May cause mild eye irritation. May cause mild skin irritation on prolonged or repeated contact. Inhalation of mists may cause mild mucous membrane and respiratory irritation.

4. FIRST AID MEASURES

Eye: Immediately flush victim's eyes with large quantities of water, holding the eyelids apart. Get medical attention if irritation persists.
Skin: Wash skin thoroughly with soap and water. Get medical attention if irritation develops. Remove and launder clothing before re-use.
Ingestion: Do not induce vomiting. Rinse mouth with water and give one glass of water to drink. Never give anything by mouth to an unconscious or convulsing person. Get immediate medical attention.
Inhalation: Remove victim to fresh air. If breathing is difficult or irritation persists, Get medical attention**.**

5. FIRE FIGHTING MEASURES

Flashpoint: None
Flammable Limits: LEL: Not applicable **UEL**: Not applicable
Autoignition Temperature: None
Extinguishing Media: Use media appropriate for surrounding fire. Cool fire exposed containers and structures with water.
Unusual Fire or Explosion Hazards: None known.

Special Fire-Fighting Instructions: Firefighters should wear positive pressure self-contained breathing apparatus and full protective clothing.
Hazardous Combustion Products: Thermal decomposition may yield oxides of sodium and phosphorus.
Explosion Data (sensitivity to mechanical impact or static discharge): None known.

6. ACCIDENTAL RELEASE MEASURES

Evacuate spill area and keep unprotected personnel away. Wear appropriate protective clothing as described in Section 8. Dike and collect liquid or absorb with an inert absorbent and place in appropriate containers for disposal. Prevent spill from entering sewers and water courses. Report releases as required by local, state and federal authorities.

7. HANDLING AND STORAGE

Handling: Avoid contact with the eyes. Avoid prolonged or repeated skin contact. Avoid breathing mists or aerosols. Wear protective clothing and equipment as described in Section 8. Use with adequate ventilation. Wash thoroughly with soap and water after handling. Keep containers closed when not in use.

Do not reuse containers. Empty containers retain product residues can be hazardous. Follow all MSDS precautions when handling empty containers.

Storage: Store in a cool, dry, well ventilated area away from incompatible materials. Protect from physical damage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines:

Inorganic Phosphates	5 mg/m3 PEL-TWA (respirable as PNOC) 15 mg/m3 PEL-TWA (total dust as PNOC)

Engineering Controls: Use with adequate general or local exhaust ventilation to maintain exposure levels below the occupational exposure limits.
Respiratory Protection: In operations where exposure levels are exceeded, a NIOSH approved respirator with dust/mist cartridges or supplied air respirator appropriate for the form and concentration of the contaminants should be used. Selection and use of respiratory equipment must be in accordance with OSHA 1910.134 and good industrial hygiene practice.
Skin Protection: Wear impervious gloves such as rubber or neoprene if needed to avoid prolonged skin contact.
Eye Protection: Safety goggles recommended.
Other: Long-sleeved clothing and long pants recommended to avoid prolonged skin contact. Suitable washing facilities should be available in the work area.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance And Odor: Clear to slightly turbid, viscous, opaque liquid with a characteristic odor.

Physical State: Liquid	**Boiling Point:** >100°C
Vapor Density: Same as water	**Vapor Pressure:** Same as water
Solubility In Water: Soluble	**Evaporation Rate:** Same as water
Specific Gravity: 1.36-1.44	**pH:** 4-7

Melting Point: Not applicable	**Octanol/Water Coefficient:** Not determined
VOC Content: 0%	

10. STABILITY AND REACTIVITY

Stability: Stable under normal storage and handling conditions.
Incompatibility: None known.
Hazardous Decomposition Products: When heated to decomposition emits toxic oxides of sodium and phosphorus.
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

HEALTH HAZARDS:
Ingestion: Ingestion may cause mucous membrane and gastrointestinal irritation. May cause nausea, vomiting and diarrhea. Large amounts may cause decreased blood pressure, decreased heart rate and coma.
Inhalation: Inhalation of mists may cause mild irritation of the nose throat and upper respiratory tract.
Eye: May cause mild irritation with pain and tearing.
Skin: May cause mild irritation on prolonged or repeated contact.
Sensitization: This material is not known to cause sensitization.
Chronic: None known.
Carcinogenicity: None of the components is listed as a carcinogen or suspected carcinogen by IARC, NTP or OSHA.
Mutagenicity: None currently known.
Medical Conditions Aggravated by Exposure: Employees with pre-existing eye and respiratory disease may be at increased risk from exposure.

Acute Toxicity Values:
Inorganic Phosphate: LD50 oral rat 3053 mg/kg.

12. ECOLOGICAL INFORMATION

No ecotoxicity data is available for the product.

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with local, state and federal environmental regulations.

14. TRANSPORT INFORMATION

Dot Hazardous Materials Description:
Proper Shipping Name: Not Regulated
UN Number: None
Hazard Class/Packing Group: None
Labels Required: None

15. REGULATORY INFORMATION

CERCLA: Releases above the reportable quantity of 8,300 lbs must be reported to the National Response Center. Many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.

SARA Hazard Category (311/312): Not Hazardous

SARA 313: This product contains the following chemicals subject to Annual Release Reporting Requirements Under SARA Title III, Section 313 (40 CFR 372): None

EPA TSCA Inventory: All of the ingredients in this product are listed on the EPA TSCA Inventory.

CANADA:
This product has been classified under the CPR and this MSDS discloses information elements required by the CPR.
Canadian CEPA: All the components of this product are listed on the Canadian DSL.
Canadian WHMIS Classification: Not a controlled product.

16. OTHER INFORMATION

NFPA Rating: Health = 0 Fire = 0 Reactivity = 0
HMIS Rating: Health = 0 Fire = 0 Reactivity = 0

NOTICE

This above information is believed to be correct but does not propose to be all inclusive and shall be used only as a guide. Sterling Water Technologies LLC shall not be held liable for any damage resulting from handling or from contact with the above product. This information relates only to the product designated herein and does not relate to its use in combination with any other material or process.

APPENDIX E

CAMPO HILLS WATER ION EXCHANGE SYSTEM
ENGINEERING SUBMITTAL 2004

Campo Hills

Disposable Resin Ion Exchange System

Engineering Submittal

Basin Water
8731 Prestige Ct
Rancho Cucamonga CA, 91730
(909) 481-6800

Prepared 05-10-04
REV. 08-30-04

Campo Hill DHS Submittal Package

1 Section 1 – Summary

1.1 Introduction

This package describes the engineering details for the disposable resin ion exchange treatment system proposed for installation at the Camp Hills development. This unit will be used to reduce uranium concentrations to within drinking water standards.

1.2 Purpose of Treatment Unit

The uranium concentration in the water supply at the Campo Hills system is 55 pCi/L. This exceeds the maximum contaminant level (MCL) of 20 pCi/L. This disposable resin treatment unit will reduce uranium concentrations in the treated water delivered to the storage tank to below the MCL.

1.3 Treatment Technology

The unit will remove uranium using standard type 1 strong base anion exchange. NSF approvals for the resin are provided later in this document.

The unit is a passive system; raw water is pumped through the vessels containing the resin by equipment provided by others.

When the resin approaches its removal capacity the resin will be disposed of and replaced with fresh resin.

1.4 Configuration of Treatment Unit

The resin is held in HDPE fiberglass filament wound pressure vessels. Raw water is supplied to the vessels from media filters provided by others. Treated water is delivered into a large storage tank, also provided by others. There is a total of six vessels 36" diameter each, grouped into 3 pairs. Each pair will normally be operated as a lead-lag pair. In each pair, the lead vessel provides the bulk of the anion removal, while the lag vessel acts as a guard vessel. The maximum flow rate for each individual vessel is 100 gpm.

The three pairs of vessels are piped in parallel on common raw water and treated water headers.

Manual valves and a piping manifold are provided for each vessel pair which allows either vessel in a pair to be easily configured as the lead or lag vessel. Also the vessels in each pair may be operated in parallel if desired. A dedicated flowmeter is installed on each vessel which measures and totalizes the flow through each individual vessel. Valve and piping details are provide in the P&ID drawings and in the mechanical drawings provided later in this document.

Manual throttling valves are provided on each vessel to allow the adjustment of flows among the vessels in service if desired.

Raw water is supplied to the vessels from media filters provided by others. Treated water is delivered into a large storage tank, also provided by others.

1.5 Treatment Unit Operation

The unit will normally be operated with all lead lag pairs online. The operator will keep a record of total number of gallons treated by each vessel using the flowmeters installed on each vessel. The operator will periodically sample the combined treated water delivered to the tank as well as the product water from each Lead vessel. When the uranium concentration in the product of a lead vessel reaches or exceeds the limits discussed later in this document, the resin will be changed out in the lead vessel and replaced with fresh resin. The vessel which was previously the lag vessel will be moved into the lead the position and the vessel with the newly loaded fresh resin will be moved into the lag position.

1.6 Sample Points

Sample taps are provided for the treated water from each individual ion exchange vessel. Sample taps are also provided on the raw and treated water headers. Sample point locations, names, and functions are detailed on the P&ID drawings.

1.7 Treatment Chemicals

There are no treatment chemicals used by this unit.

1.8 Effects of Other Anions

A computer model of the resin performance using the water chemistry at this site indicates that the ion exchange process will not cause unacceptable changes in water chemistry with respect to Chloride, Nitrate, Arsenic, Sulfate, or Bicarbonate.

1.9 Resin Change Out Triggers

Resin will be changed out of the lead vessel(s) in response to the triggers summarized in the table below.

Item	Change Out Triggers	Notes

Item	Change Out Triggers	Notes
Lead Vessel Effluent Uranium Concentration	> 15 pCi/L	
Combined Treated Water Uranium Concentration	> 15 pCi/L	Further sampling may be conducted to determine if an individual vessel pair(s) may still remain in service.
Lead Vessel Bed Volumes Treated	Volume Treated has exceeds planned resin life. (initial value is 25,000 bv's)	If lab results show that a lead vessel is still producing treated water <15 pCi/L U, bed life may be extended at operator's discretion

1.10 Redundancy and Spare Treatment Capacity

There is substantial spare capacity in the treatment unit design. The unit has been designed for a nominal treatment capacity of 300 gpm. Initial flows at this site are estimated to average approximately 80 gpm (based on 124 AF/year) and peak near 150 gpm. This effectively provides a treatment capacity, which is double the expected initial demand.

The unit can be operated with multiple vessels out of service and still provide the necessary treated water flows to meet demand at this site at the initial and projected future flows.

The ion exchange reaction is extremely fast, treatment capacity is not significantly effected by resin loading rate (in gpm/ft2). The flow rate through the vessels can be greatly increased while still providing adequate anion removal.

The resin loading rate even at the nominal maximum flow of 300 gpm is with the three vessel pairs operating in lead lag mode the resin loading rate is only 14 gpm/ft2, well below the limits of the resin.

Additional treatment capacity (above the 300 gpm currently provided) can easily be obtained from this unit by increasing raw water pumping capacity to the unit. Although not planned for normal operations, additional capacity can also be achieved by operating the all six beds in parallel rather than in three lead lag pairs.

1.11 Residual Management - Resin Disposal

The only residual requiring special attention generated by the uranium treatment system, is the spent ion exchange resin. The spent resin will be packaged, characterized, transported and disposed of at an appropriate disposal facility, in accordance to Federal, State and Local regulations. Once the resin has reached its adsorption capacity, the bed will be isolated and taken off-line by closing the pertinent valves. Exhaustion of the resin is predetermined by the number of bed volumes (BVs) of water processed, and based on water analysis as covered under Section 1.9 of this submittal. The spent resin is then removed from the adsorption vessel and replaced with virgin resin. Actual change out of resin will take approximately four hours. The plant could be shut down for up to 48 hours during change out and set up. System storage capacity of 705,000 gallons will be adequate to meet normal demands for up to 48 hours. Change outs should not be scheduled during peak day demand periods. The spent resin will be packaged in DOT approved containers. Resin change-outs will be done by Basin Water (under a Water Services Agreement) personnel or Basin subcontracted personnel.

Initially, the packaged resin will remain in its container at the Campo Hills site for the purposes of dewatering and sampling for subsequent characterization analysis. The requested analysis will be done in accordance to the requirements specified under 40 CFR 261 (Federal), CCR Title 22 (California), and as well as the *Waste Acceptance Criteria* established by the disposal facility. Only certified laboratories will be used to perform the required analytical testing. The disposal company identified for the disposal of the spent resin material is American Ecology Corporation (www.americanecology.com) at their Grandview, ID facility. The characterization process may take up to 4 weeks to complete.

Once the material has been characterized in accordance to the analytical results, the "Generator Waste Product Questionnaire" and "Waste Acceptance Criteria Addendum" forms will be completed, executed by the system operator (the Generator) and submitted for approval to AEC. AEC will review the submittal in accordance to their waste acceptance permit, and issue an approval. Once approved the waste stream will be issued its own unique tracking number. This process can take up to 3 weeks, however it will only be necessary during the initial approval process of the waste stream, thereafter the only requirement is the submittal of a recent chemical analysis on an annual basis.

The AEC approval gives way for scheduling the transportation of the waste stream to the disposal facility. Only DOT and EPA certified and approved haulers will be contracted to transport the waste stream to the final destination for disposal. The spent resin will not remain on-site for more than 90 days, although it is expected that it will be characterized as a Non-Hazardous Material.

- END SECTION 1 -

2 Section 2 – Technical Details

2.1 Unit Flow Specifications

Item	Detail	Notes
Total Max Flow	300 gpm	Nominal, unit can actually handle greater than 300 gpm if necessary. See redundancy and spare capacity section above.
Expected initial peak flow	150 gpm	
Expected initial average flow	80 gpm	Based on 124 AF/yr

2.2 Vessel Specifications

Item	Detail	Notes
Vessel Type	Fiberglass wound with HDPE liner	
Vessel Size	185 Gallon / 25 cubic feet. 36" diameter	7.07 ft2 cross sectional area
Vessel Configuration	Qty 3 lead/lag pairs	
Flowmeter type	Paddlewheel, with indicator and totalizer.	Individual flowmeter on each vessel.

2.3 Resin Specifications

Item	Detail	Notes
Resin Type	Standard Type 1strong base anion exchange resin.	
Resin Manufacturer & Type	Rohm & Haas PWA402	
Resin Certification	NSF 61	NSF certification provided later in this document for reference.
Resin Qty	25 ft3 per vessel	
Expected resin life	33,000 bed volumes (= 6.1 million gallons)	Predicted by computer model based on Campo Hills' water chemistry. At this point vessels effluent uranium concentration will begin to rise above treatment goal of 20 pi/Cl.
Planned resin run time	25,000 bed volumes	75% of computer model's predicted for resin life.

2.4 Resin Loading Rates

Below are resin loading rates at various flow rates. Calculations assume all three vessel pairs are online with each pair operating in lead/lag mode.

Flow	Resin Loading Rate	Notes
80 GPM	3.8 gpm/ft2	Expected average flow
150 GPM	7.1 gpm/ft2	Expected actual PEAK flow
300 GPM	14.1 gpm/ft2	Nominal maximum flow

2.5 Resin Change Out Frequency Estimation

Resin life predictions for lead vessel at various flow rates are provided in the table below. Calculations assume all three vessel pairs are online and that resin change out occurs at 25,000 bed volumes. The table below shows that even if the unit were operated at the maximum rated flow the resin change out frequency would be completely manageable at 32 days.

Flow	**Predicted Frequency of resin change out**	**Notes**
80 GPM	120 Days	Expected average flow
150 GPM	64.2 Days	Expected actual PEAK flows
300 GPM	32.1 Days	Nominal maximum flow

- END SECTION 2 -

3 Section 3 - Suggested Water Quality Monitoring Plan

3.1 Introduction

The disposable resin units are expected to have a resin life of approximately 25,000 bed volumes. This corresponds to 120 days of continuous operation if flowing at the expected average initial flows for this facility. For this reason it is impractical to perform a demonstration test of these units to waste throughout the life cycle of the resin to waste before putting them into service.

The uranium removal vessels are operated in series in a lead/lag configuration. With this configuration, the lead vessel provides the bulk of the uranium removal, while the second bed is acting as a "guard bed". This means that even as uranium begins to leak out of the lead bed, the lag bed will remove this uranium and prevent this from effecting final treated water uranium levels in a short time frame.

In order to establish reliability of the system three test protocols have been proposed as summarized in the table below:

Test Protocol	When to Follow
Demonstration Test Sampling Protocol	First 24 hours of operation after commissioning.
Initial Run Sampling	During initial deliveries of drinking water. Continue to follow until first resin change out event occurs.
Normal Operation Sampling Protocol	Follow during first year of operation. Protocol may be adjusted as operational experience is gained.

3.2 Demonstration Test

1) During the demonstration test run the unit should maintain effluent uranium at or below the treatment goal of 20 pCi/L.

2) The demonstration portion of the test will continue until the unit has reached at least 24 hours of run time at a flow of at least 50 gpm.

3) During the demonstration test the following samples will be collected every 4 hours:
   a. Raw Water
   b. Product Water

4) These samples will be analyzed by an approved laboratory for uranium.

The results of the demonstration test will be submitted to DHS for review. The unit will not be operated for drinking water service until approval from the DHS has been received in writing.

3.3 Initial Run Sampling Protocol

After approval has been received from DHS for drinking water service. The unit will be placed online. Upon entry into service the "Initial Run Sampling Protocol" will be followed for one year. It is expected that the first resin change out will occur approximately 120 days after startup.

During the initial Sampling Run the following samples will be collected and analyzed for uranium in accordance with the table below .

Sample Point	Analysis	Frequency
Raw Water	Uranium	Monthly
Treated Water	Uranium	Weekly
Lead Vessel Effluent	Uranium	Weekly
Lead Vessel Effluent and Treated Water Effluent	pH	Daily grab sample by operators.

3.4 Normal Operations Sampling Protocol

After one year of operation the County will submit results to DHS to request reduced sampling. Once approval has been received from DHS, the operator will shift to the "Normal Operations Sampling Protocol". This protocol may be reviewed from time to time upon request from the County and may be revised to better reflect changes noted during routine operations.

The suggested monitoring frequency for "Normal Operations Sampling Protocol" will consist of collecting samples in accordance with the table below. However, this suggested monitoring frequency may be modified depending on results of first year of monitoring.

Sample Point	Analysis	Suggested Frequency
Raw Water	Uranium	Every 3 months
Treated Water*	Uranium	Monthly until detected, then weekly.
Lead Vessel Effluent*	Uranium	Monthly until detected, then every 14 days.

*.

- END SECTION 3 -

BasinWater

June 22, 2004

Mr. Steve Matthews
County of San Diego Wastewater Management
5555 Overland Avenue – Room 260
San Diego, CA 92123

RE: Campo Hills Uranium Treatment – Disposable Resin System

Dear Mr. Matthews:

This is in response to questions raised yesterday during our meeting regarding the effects of manganese and nitrate in the operation of the above referenced treatment system, specifically the ion exchange resin.

Manganese
Basin understands that chlorination of the water will occur downstream from the ion exchange treatment process; therefore fouling of the resin by oxidized manganese is not anticipated. The Pata Filtration Plant located upstream from the Basin treatment unit is designed to produce water to 0.2 NTU, and it will serve as a removal mechanism for oxidized manganese present in the source water.

Furthermore, Basin's experience has been that at the level in which manganese in present in the Campo Hills water source will not have an adverse affect on the removal of uranium or resin bed life.

Nitrate
The presence of nitrate in the source water will not influence the resin's capacity in the removal of uranium. At the start of the treatment system a reduction in nitrate is realized, however, with continued operation nitrate removal will cease, without affecting uranium removal capacity.

The ion exchange treatment system is comprised of a lead-lag configuration. There are six vessels grouped into three pairs. The lead vessel provides the bulk of the anion removal, while the lag vessel acts as a guard vessel. This configuration significantly reduces the possibility of introducing water into the water supply system that exceeds the regulatory requirements.

We hope that this answers your questions, and eliminates any concerns regarding the efficacy of the Basin treatment system in relation to the presence of manganese and nitrate in the water supply.

Should you require further information; do not hesitate to contact me at (909) 481-6800.

Respectfully,

Digitally signed by Orlando A. Carreno
DN: cn=Orlando A. Carreno, c=US
Date: 2004.06.22 15:46:41 -07'00'

(for) Peter L. Jensen
BasinWater, Inc.

Cc: J. Houston – CH
L. Rowe

8731 Prestige Court, Rancho Cucamonga, CA 91730 Tel. (909) 481-6800 Fax (909) 481-6801 www.basinwater.com

Campo Hills

Disposable Resin Ion Exchange System
Engineering Submittal

SECTION 4

- P&ID Drawings
- Mechanical Drawings

SEP 07 2004

GENERAL INSTRUMENT OR FUNCTION SYMBOLS

	PRIMARY LOCATION (a)NORMALLY ACCESSIBLE TO OPERATOR	FIELD MOUNT	AUXILIARY LOCATION (b)NORMALLY ACCESSIBLE TO OPERATOR
DISCRETE INSTRUMENTS	⊖	○	⊖
SHARED DISPLAY, SHARED CONTROL	▭	▢	▭
PROGRAMMABLE LOGIC CONTROL	⬡	⬡	⬡

(a) NORMALLY INACCESSIBLE OR BEHIND-THE-PANEL DEVICES OR FUNCTIONS ARE DEPICTED BY USING THE SAME SYMBOLS BUT WITH DASHED HORIZONTAL BARS, I.E.

⊖ ⬡ ⬡ ⊖ ⬡ ⬡

SINGLE INSTRUMENT OR OTHER COMPONENT HAVING MULTIPLE FUNCTIONS

(XXX) SOFTWARE OR LOGIC RESIDENT AT PROGRAMMABLE LOGIC CONTROLLER (PLC) XXX. SEE ASSOCIATED LOGIC DIAGRAMS.

HARDWIRED CONTROL INTERLOCK

(XXX) DESIGNATIONS OF CONTROL FUNCTIONS ASSOCIATED INSTRUMENT OR OTHER COMPONENTS.

AM – AUTO/MANUAL
HOA – HAND/OFF/AUTO
HOR – HAND/OFF/REMOTE
LOS – LOCKOUT STOP
LR – LOCAL/REMOTE
MOA – MANUAL/OFF/AUTO
OO – ON/OFF
OCA – OPEN/CLOSE/AUTO
OOC – OPEN/OFF/CLOSE
POT – POTENTIOMETER
RSL – RAISE/STOP/LOWER
SD – SHUTDOWN
SEL – SELECT
SP – SET POINT
SR – START/RESET
SS – STOP/START

INSTRUMENT PANEL MOUNTED WITH COMPUTING OR CONVERTING FUNCTION

CONVERT
E – VOLTAGE
I – CURRENT
P – PNEUMATIC
A – ANALOG
B – BINARY
H – HYDRAULIC
O – ELECTROMAGNETIC, SONIC
R – RESISTANCE (ELECT.)
D – DIGITAL

COMPUTE
SUMMING Σ
SUBTRACTOR −
MUTIPLYING X
DIVIDING ÷
ROOT EXTRACTION √
PROPORTIONAL P
DERIVITIVE R
AVERAGING Σ/n
RATIO ÷
DIFFERENCE Δ
HIGH SELECTING >
LOW SELECTING <
INTEGRAL I

(XXX) PANEL MOUNTED PILOT LIGHT WITH PANEL NUMBER DESIGNATION(I.e. XXX = 100, 200, ETC.).

PLC I/O

= DIGITAL OUTPUT
= ANALOG OUTPUT
= DIGITAL INPUT
= ANALOG INPUT

IDENTIFICATION LETTERS

	FIRST-LETTER		SUCCEEDING-LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION				
C	CONDUCTIVITY			CONTROL	CLOSED
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	GAGE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOTOR	MOMENTARY			MIDDLE, INTERMEDIATE
N	TORQUE		ISOLATE	ISOLATOR	
O			ORIFICE, RESTRICTION		OPEN
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	INTRUSION	X AXIS			
Y	EVENT, STATE OR PRESENCE	Y AXIS		COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, FINAL CONTROL ELEMENT	

NOTES

1. ADDITIONAL INSTRUMENTATION AND CONTROL SYMBOLS MAY BE USED AS REQUIRED. SYMBOLS AND NOMENCLATURE ARE BASED ON ISA STANDARDS S5.1, S5.2, S5.4.
2. SEE ASSOCIATED ELECTRICAL AND MECHANICAL SYMBOL SHEETS FOR ADDITIONAL SYMBOLS AND ABBREVIATIONS.

INSTRUMENT LINE SYMBOLS

INSTRUMENT OR CONNECTION TO PROCESS (1)
PNEUMATIC SYMBOL (2)
ELECTRIC SYMBOL
HYDRAULIC SYMBOL
CAPILLARY TUBE
ELECTROMAGNETIC OR SONIC SIGNAL (3) (GUIDED)
INTERNAL SYSTEM LINK (SOFTWARE OR DATA LINK)

PAGE/PROCESS CONTINUATIONS

X Y1-Z = CONTINUED ON SHEET Y1-Z AT A SIMILAR ARROW WITH LETTER X.
VAR. = CONTINUED ON MULTIPLE SHEETS.
= CONTINUATION TO OR FROM EQUIPMENT NOT SHOWN

TAG NUMBERS

TYPICAL FORMAT TIC-1
TIC – FUNCTIONAL IDENTIFICATION
T – FIRST-LETTER
IC – SUCCEEDING-LETTER(S)
1 – LOOP NUMBER
INSTRUMENT IDENTIFICATION OR TAG NUMBER
FIRST LETTER
SUCCEEDING LETTER
INSTRUMENT LOOP NUMBER
(INSTRUMENT SYMBOLS)

VALVE SYMBOLS

GLOBE
ANGLE
BALL VALVE
SOLENOID VALVE
BACKFLOW PREVENTOR
DIAPHRAM OR PINCH VALVE
2 WAY SOLENOID VALVE
FLOAT VALVE

VALVE ACTUATORS

SOLENOID
PREFERED FOR DIAPHRAGM ASSEMBLED WITH PILOT. ONE INPUT SHOWN (TYPICALLY WITH ELECTRIC INPUT)
ROTARY MOTOR (SHOWN TYPICALLY WITH ELECTRIC SIGNAL, MAY BE HYDRAULIC OR PNEUMATIC)

PUMP AND COMPRESSOR SYMBOLS

CHEMICAL FEED PUMP
EDUCTOR
PUMP

FLOW

MAGNETIC FLOWMETER
TURBINE-OR PROPELLER TYPE PRIMARY ELEMENT

LEVEL

TIPPING FLOAT LEVEL SWITCH

MISCELLANEOUS SYMBOLS

1/4 TURN MOTORIZED BALL VALVE
FEED HEADER
BLIND FLANGE
ELECTRIC MOTOR
BAG FILTER

REV	DATE	BY	DESCRIPTION
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NC	08/14/03	JCZ	ORIGINAL DRAWING

SCALE:
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DESIGNED D. ZIOL
DRAWN J. ZITLAU
CHECKED B. ZINN

Basin Water

BASIN WATER MANUFACTURING DESIGN

SYMBOLS AND NOMENCLATURE – 1

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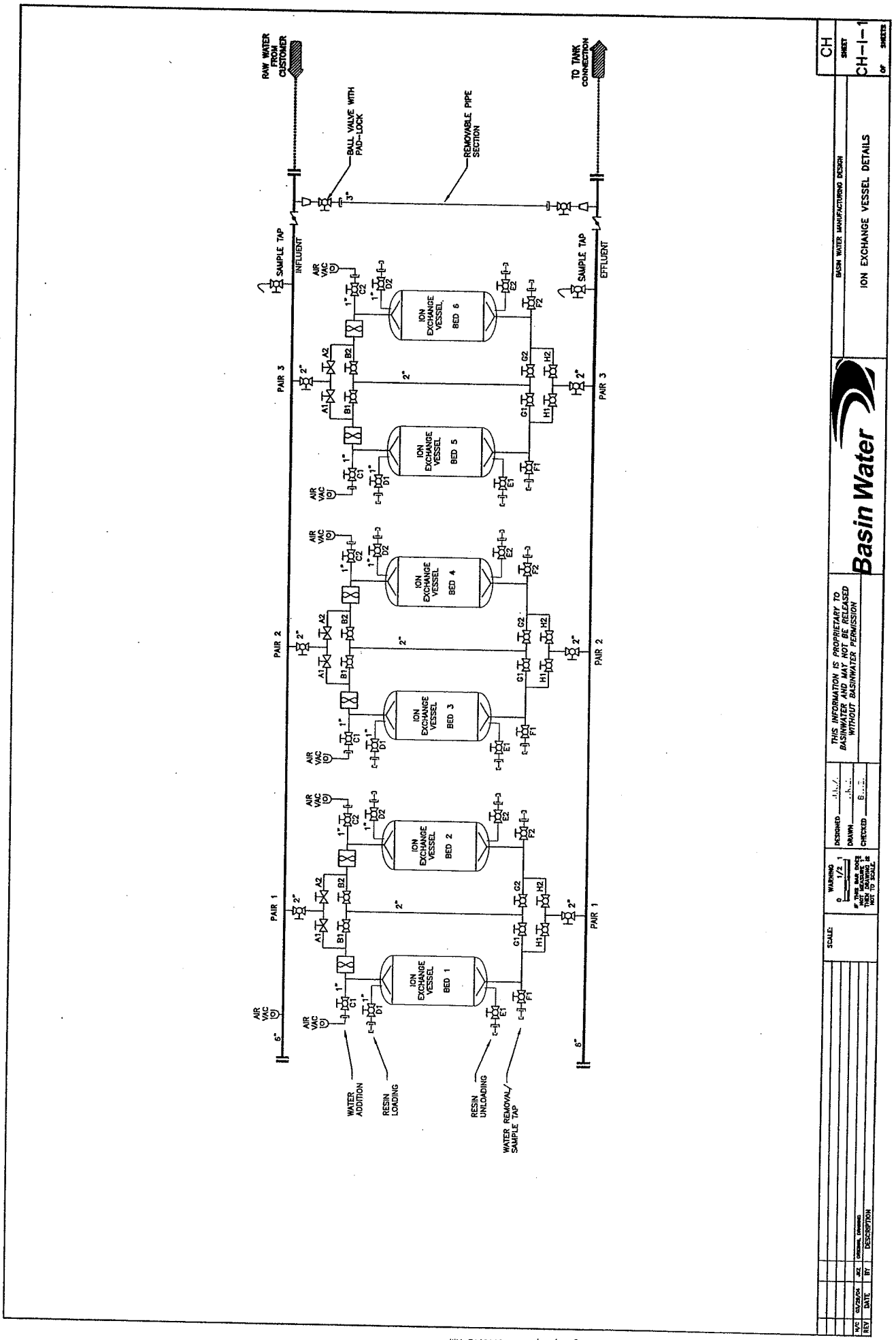

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SEP 07 2004

016

BASIN WATER ion EXCHANGE SYSTEM

Campo Hills
(Drawing Documentation)

Prepared By:
Basin Water, Inc.
8731 Prestige Court
Rancho Cucamonga, CA 91730
Tel: (909) 481-6800
Fax: (909) 481-6801

May 2004

BasinWater

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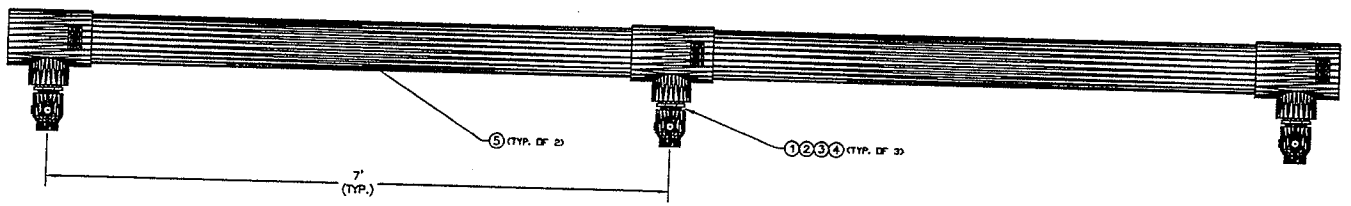
Table of Contents



ITEM	QTY.	DESCRIPTION
1	3	6X6X3 REDUCING TEE (SOCKET)
2	3	3X2 REDUCING BUSHING (SPXS)
3	3	2" CLOSE CUT SCH 80 PVC NIPPLE
4	3	2" UTILITY BALL VALVE (SXS)
5	2	6' X __' CUT SCH 80 PVC PIPE

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SCALE: 1:2

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED J.K.Z.
DRAWN J.K.Z.
CHECKED B.J.Z.

ALL DIMENSIONS ±1/8" UNLESS OTHERWISE SPECIFIED

Basin Water

BASIN WATER MANUFACTURING DESIGN

6" X 84" CENTER HEADER ASSEMBLY

STD.

SHEET CH-C.2.1

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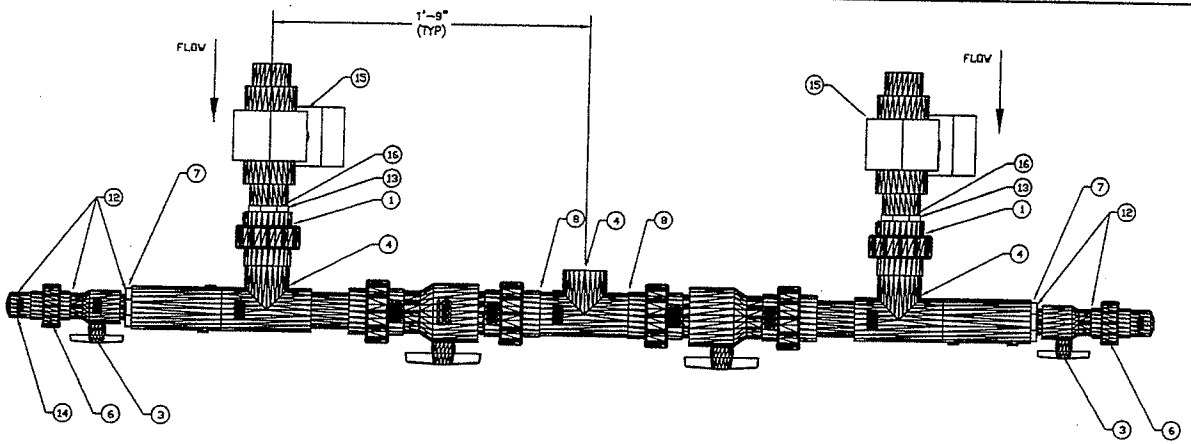

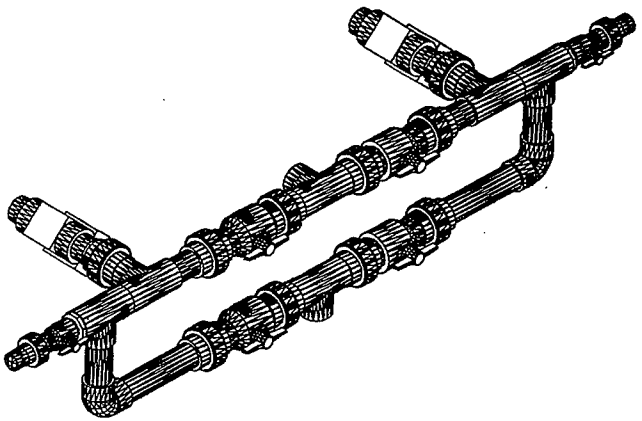

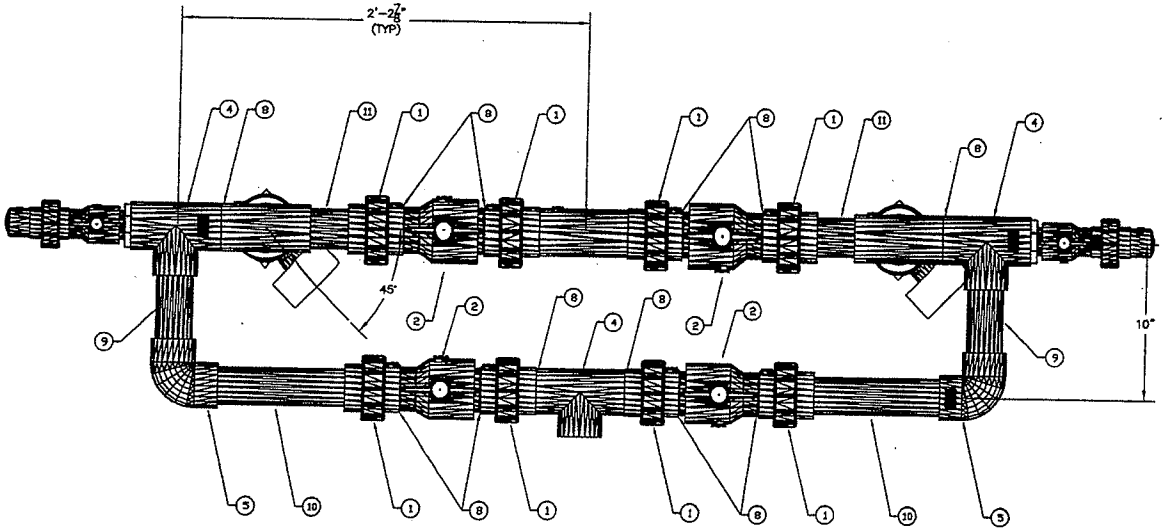

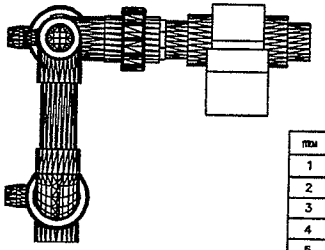

ITEM	QTY.	DESCRIPTION
1	10	2" UNION (SXS)
2	4	2" BALL VALVE
3	2	1" BALL VALVE (SXS)
4	6	2" TEE (SXSXS)
5	2	2" 90° ELBOW (SXS)
6	2	1" UNION (SXS)
7	2	2"X1" REDUCER BUSHING (SPXS)
8	16	2"X3" CUT PIPE
9	2	2"X7⅛" CUT PIPE
10	2	2"X11⅜" CUT PIPE
11	2	2"X5½" CUT PIPE
12	4	1"X2" CUT PIPE
13	2	2"X1½" BUSHING REDUCER (SPXS)
14	2	1" CAP SCH. 80 PVC (S)
15	2	1½" DIGIFLOW FLOWMETER
16	2	1½" X 2½" CUT PIPE

REV	DATE	BY	DESCRIPTION
NC	04/27/04	CDC	ORIGINAL DRAWING

SCALE: 1:4

WARNING 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
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CHECKED

ALL DIMENSIONS ±1/8" UNLESS OTHERWISE SPECIFIED

Basin Water

BASIN WATER MANUFACTURING DESIGN

BOTTOM VALVE TRANSFER ASSEMBLY
42" CENTERS

STD.

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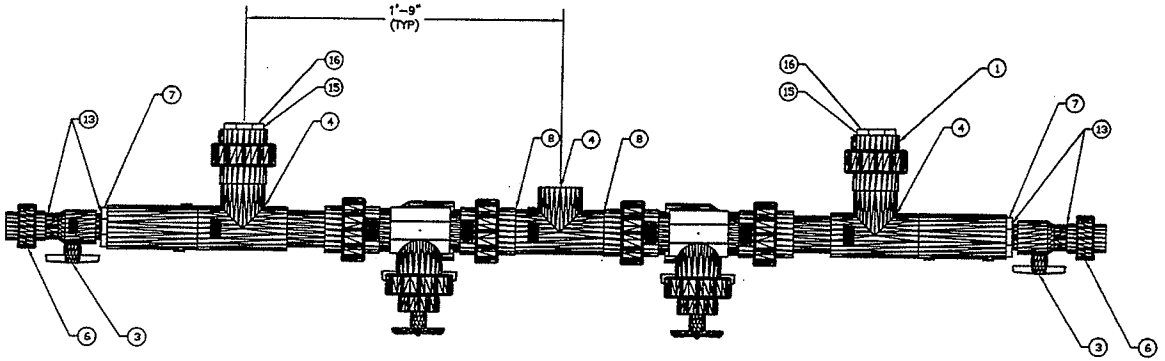

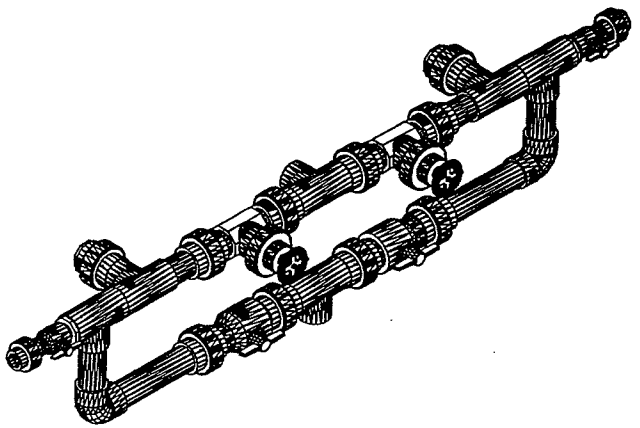

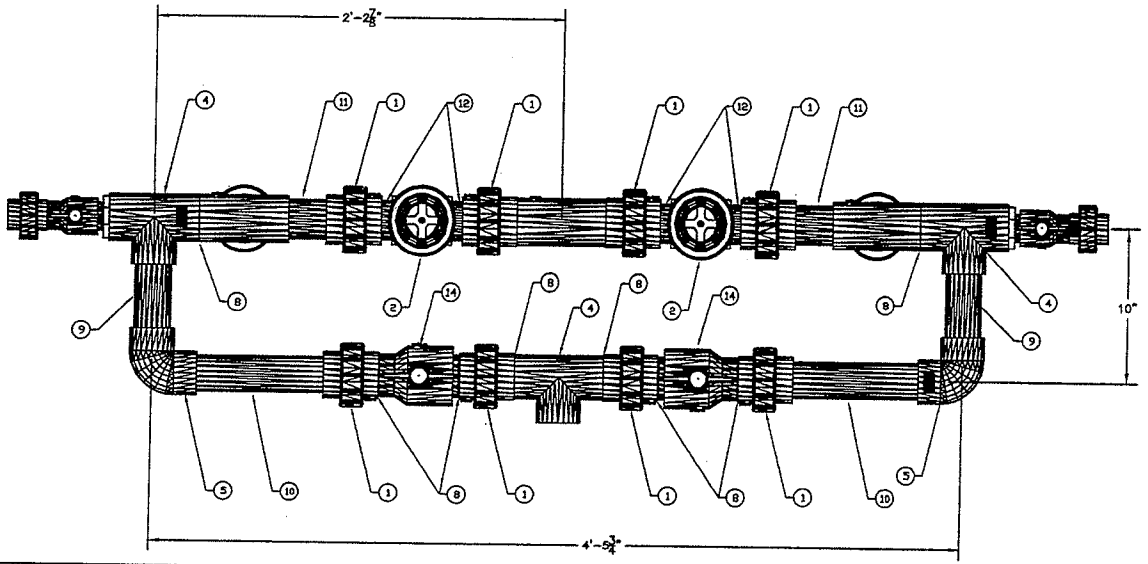

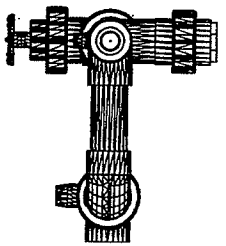

ITEM	QTY.	DESCRIPTION
1	10	2" UNION (SXS)
2	2	2" GATE VALVE
3	2	1" BALL VALVE (SXS)
4	6	2" TEE (SXSXS)
5	2	2" 90° ELBOW (SXS)
6	2	1" UNION (SXS)
7	2	2"X1" REDUCER BUSHING (SPXS)
8	12	2"X3" CUT PIPE
9	2	2"X7¼" CUT PIPE
10	2	2"X11⅜" CUT PIPE
11	2	2"X5½" CUT PIPE
12	4	2"X3½" CUT PIPE
13	4	1"X2" CUT PIPE
14	2	2" BALL VALVES (SXS)
15	2	2"X1½" REDUCER BUSHING (SPXS)

REV	DATE	BY	DESCRIPTION
NC	04/27/04	CDC	ORIGINAL DRAWING

SCALE: 1:4

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

ALL DIMENSIONS ±1/8" UNLESS OTHERWISE SPECIFIED

Basin Water

BASIN WATER MANUFACTURING DESIGN

TOP VALVE TRANSFER ASSEMBLY
42" CENTERS

STD.

SHEET CH-C.3.16

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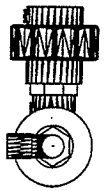

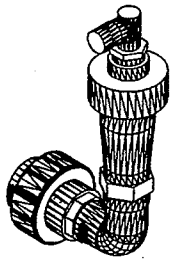

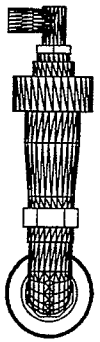

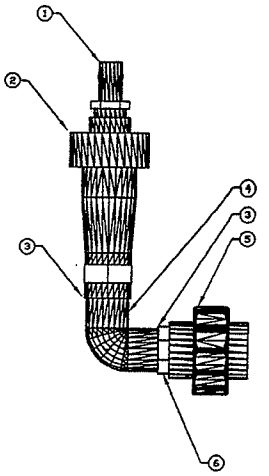

ITEM	QTY.	DESCRIPTION
1	1	¾" 90° THREADED TO HOSE
2	1	¾" AIR VAC
3	2	¾" THREADED NIPPLE
4	1	¾" 90° ELBOW (FXF)
5	1	1" UNION (SXS)
6	1	¾"X1" REDUCER BUSHING (FXS)

REV	DATE	BY	DESCRIPTION
NC	04/27/04	CDC	ORIGINAL DRAWING

SCALE: 1:1

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED JKZ
DRAWN JKZ
CHECKED BJZ

ALL DIMENSIONS ±1/8" UNLESS OTHERWISE SPECIFIED

Basin Water

BASIN WATER MANUFACTURING DESIGN

BED AIR VAC ASSEMBLY

STD.

SHEET A.1.3.4

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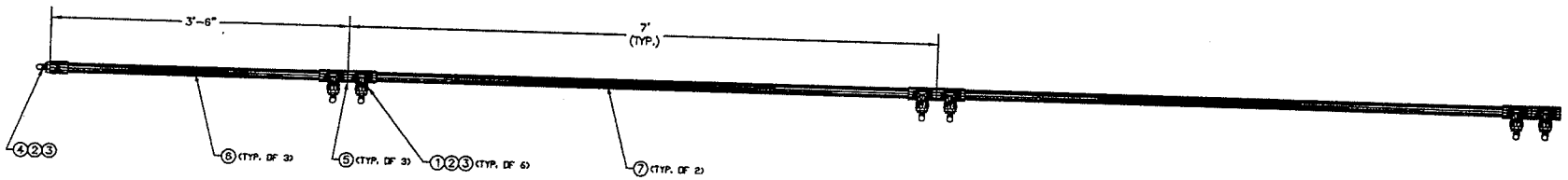


ITEM	QTY.	DESCRIPTION
1	8	1" TEE (SXSXSX)
2	7	1" X ¾" BUSHING REDUCER (SPXSX)
3	7	¾" 90 DEG. HOSE BARB (SP)
4	1	1" COUPLING (SXSX)
5	3	1" CLOSE NIPPLE
6	1	1" X __" CUT SCH 80 PVC PIPE
7	2	1" X __" CUT SCH 80 PVC PIPE

REV	DATE	BY	DESCRIPTION
NC	04/27/04	JKZ	ORIGINAL DRAWING OPTION 2

SCALE: 1:2

WARNING 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED J.K.Z.
DRAWN J.K.Z.
CHECKED B.J.Z.

ALL DIMENSIONS ±1/8" UNLESS OTHERWISE SPECIFIED

Basin Water

BASIN WATER MANUFACTURING DESIGN

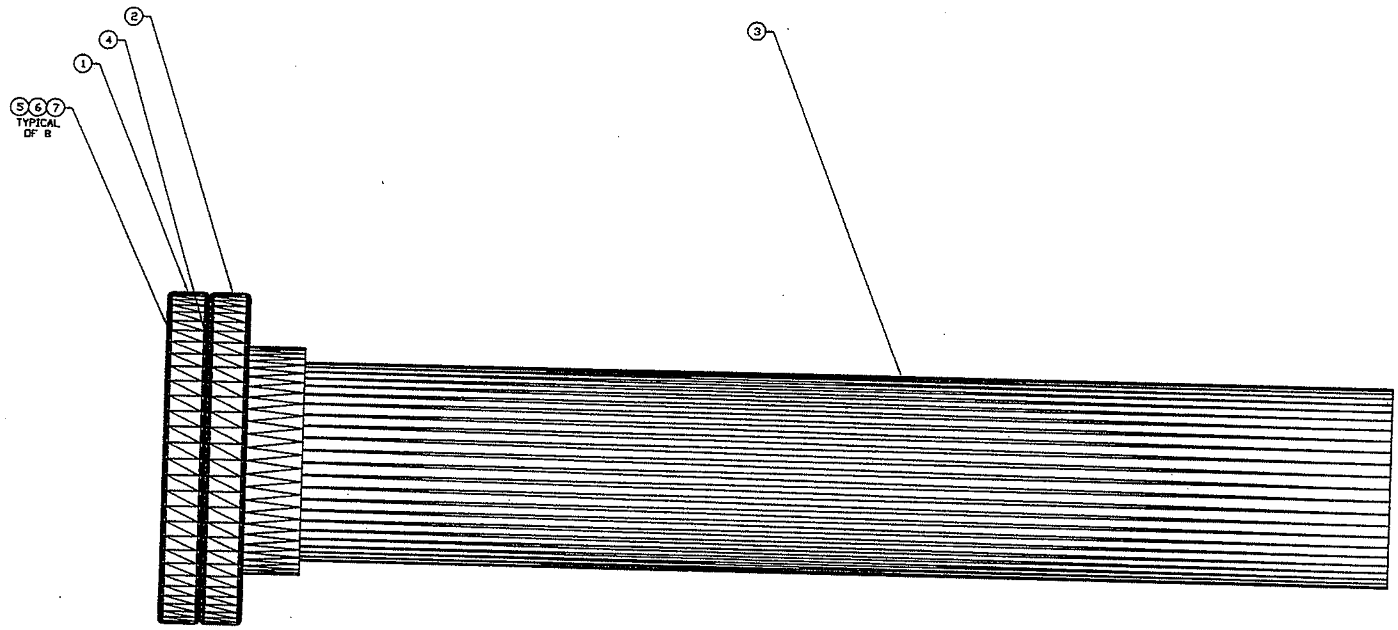
1" AIR VAC HEADER ASSEMBLY

STD.

SHEET CH-C.2.1.1

SHEET OF

SEP 0 7 2004



ITEM	QTY.	DESCRIPTION
1	1	6" FLANGE (BLIND)
2	1	6" FLANGE (SLIP)
3	1	6"X39" CUT PIPE
4	1	6" O-RING
5	8	3/4" X 3 1/2" BOLTS
6	8	3/4" NUTS
7	16	3/4" WASHERS

REV	DATE	BY	DESCRIPTION
NC	04/27/04	CDC	ORIGINAL DRAWING

SCALE: 1:2

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

THIS INFORMATION IS PROPRIETARY TO BASINWATER AND MAY NOT BE RELEASED WITHOUT BASINWATER PERMISSION

Basin Water

BASIN WATER MANUFACTURING DESIGN

LEFT HEADER EXTENSION ASSEMBLY

CH

SHEET CH-A.5.1

OF SHEETS

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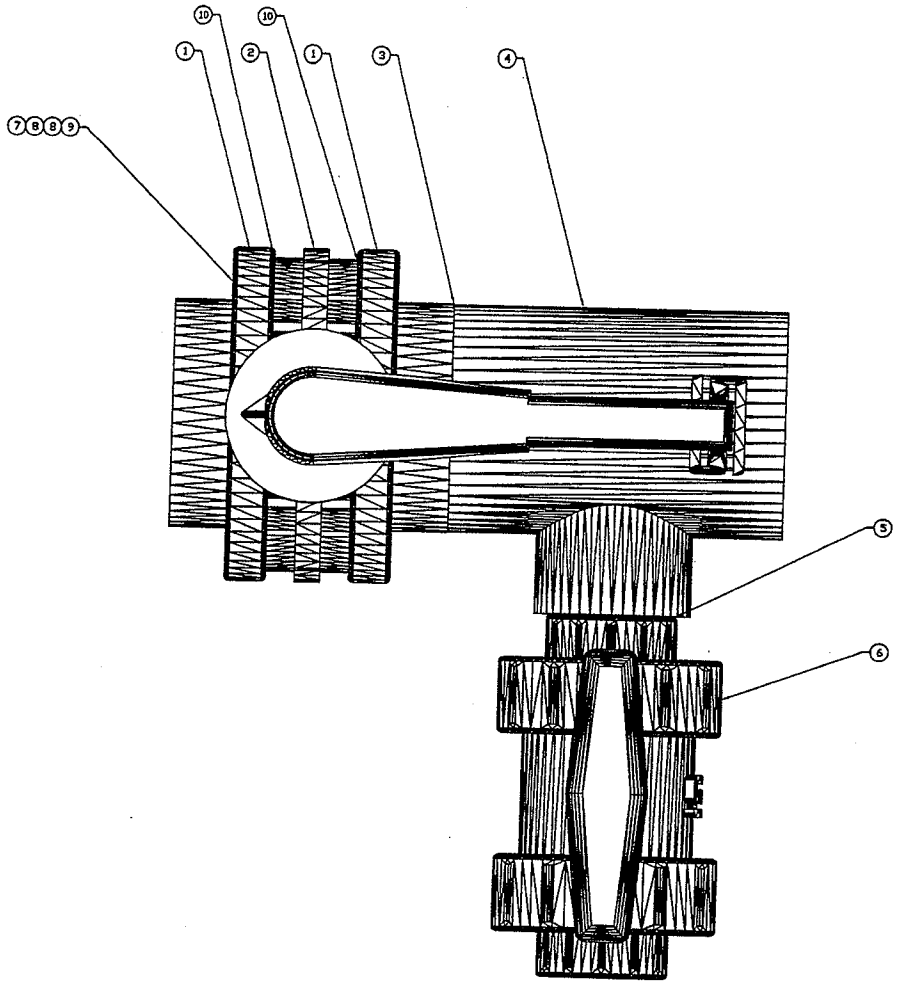
SEP 07 2004



ITEM	QTY.	DESCRIPTION
1	2	6" VAN STONE FLANGE
2	1	6" BUTTERFLY VALVE
3	1	6"X5⅝" CUT PIPE
4	1	6"X6"X3" REDUCER TEE (SXSXS)
5	1	3"X3⅝" CUT PIPE
6	1	3" LOCKING VALVE (SXS)
7	8	¾"X6" BOLT
8	16	¾" WASHER
9	8	¾" NUT
10	2	6" O-RING

NO	DATE	BY	DESCRIPTION
REV	04/27/04	CDC	ORIGINAL DRAWING

SCALE:

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

Basin Water

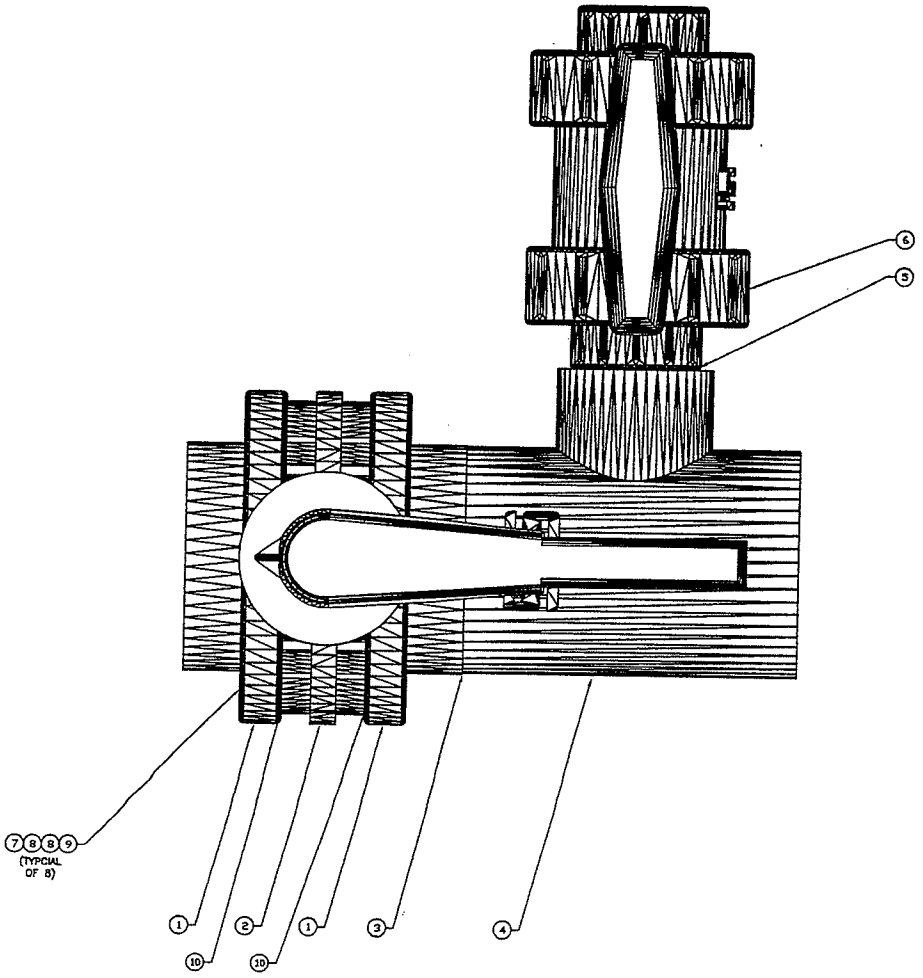
BASIN WATER MANUFACTURING DESIGN

TOP HEADER INTERCONNECT

CH

SHEET CH-A.5.2 OF SHEETS

C:\JohnZ\BASIN WATER\CAD\CampoHills\CH-A.5.2-topheaderinterconnectassembly-RevNC.dwg, 5/12/2004 8:28:38 AM



ITEM	QTY.	DESCRIPTION
1	2	6" VAN STONE FLANGE
2	1	6" BUTTERFLY VALVE
3	1	6"X5⅝" CUT PIPE
4	1	6"X6"X3" REDUCER TEE (SXSXS)
5	1	3"X3⅝" CUT PIPE
6	2	3" TRUE UNION VALVE (SXS)
7	8	¾"X6" BOLT
8	16	¾" WASHER
9	8	¾" NUT
10	2	6" O-RING

REV	DATE	BY	DESCRIPTION
NC	04/27/04	CDC	ORIGINAL DRAWING

SCALE:

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

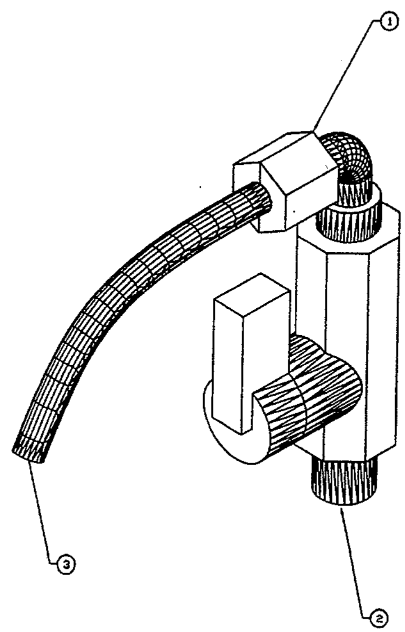
Basin Water

BASIN WATER MANUFACTURING DESIGN

BOTTOM HEADER INTERCONNECT

CH

SHEET CH-A.5.3 OF SHEETS



ITEM	QTY.	DESCRIPTION
1	1	¼" 90° ELBOW (THXCOMP)
2	1	¼" VALVE (MXF)
3	1	¼"X6" CUT TUBE

REV	DATE	BY	DESCRIPTION
NC	05/06/04	CDC	ORIGINAL DRAWING

SCALE: 2:1

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

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Basin Water

BASIN WATER MANUFACTURING DESIGN

¼" SAMPLE VALVE

STD.

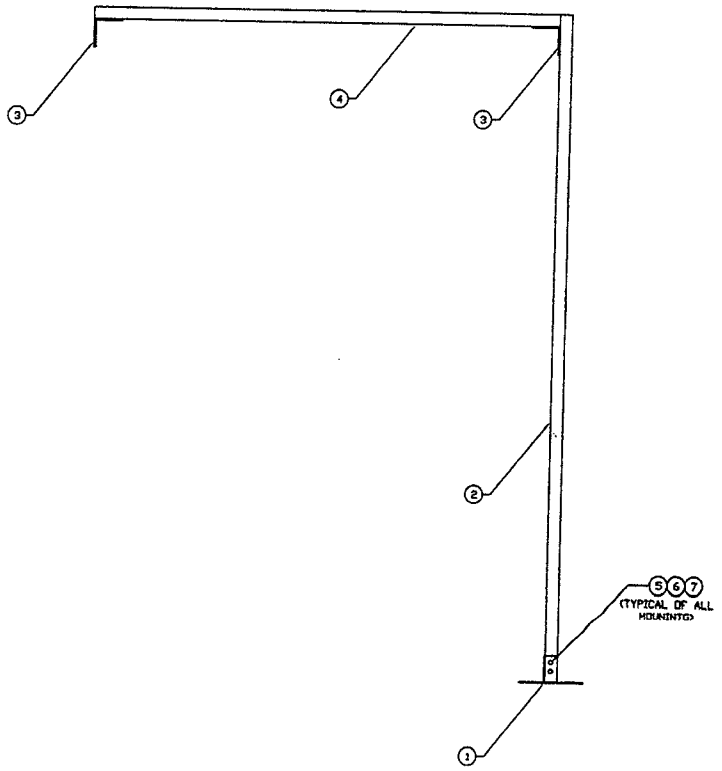
SHEET CH-A.5.4

OF SHEETS

C:\JohnZ\BASIN WATER\CAD\CampoHills\CH-A.5.4-0.25samplevalveassembly-RevNC.dwg. 5/12/2004 8:33:07 AM

SEP 0 7 2004

028



ITEM	QTY.	DESCRIPTION
1	1	STRUT BASE
2	1	1⅝"X1⅝"X88" CUT STRUT
3	2	4 HOLE 90° STRUT BRACKET
4	1	1⅝"X1⅝"X62¾" CUT STRUT
5	10	⅜"X1" BOLT
6	10	⅜" SPEED NUT
7	10	⅜" WASHER

REV	DATE	BY	DESCRIPTION
NC	05/06/04	CDC	ORIGINAL DRAWING

SCALE: 1:8

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1 THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

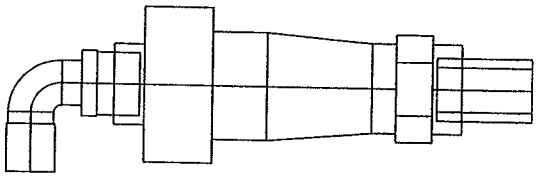
Basin Water

BASIN WATER MANUFACTURING DESIGN

VALVE TRANSFER ASSEMBLY SUPPORT BRACKET

CH

SHEET CH-A.5.8 OF SHEETS



ITEM	QTY.	DESCRIPTION
1	1	1" PVC CLOSE NIPPLE
2	1	1" AIR VAC
3	1	1" 90 DEG. HOSE BARB FITTING OD

STD.

SHEET A.1.2.12 OF SHEETS

BASIN WATER MANUFACTURING DESIGN

1" AIR VAC ASSEMBLY

Basin Water

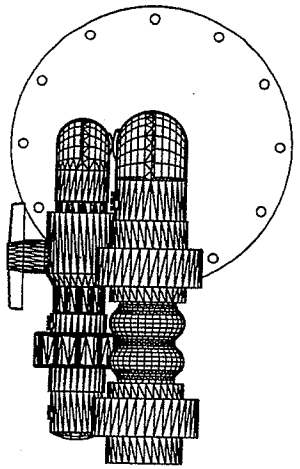
DESIGNED
DRAWN
CHECKED

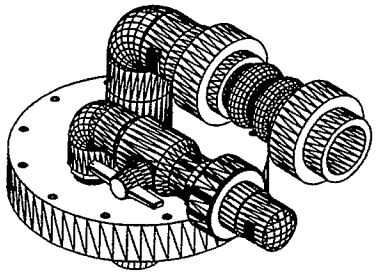
WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE AS SHOWN THEN DRAWING IS NOT TO SCALE

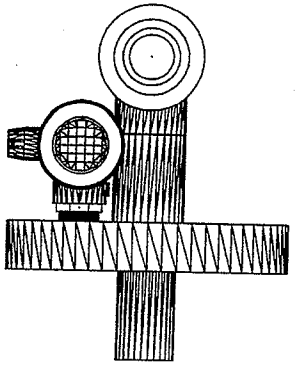
SCALE: 1:1

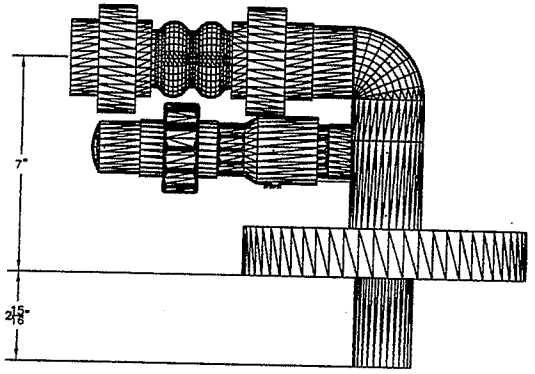
REV	DATE	BY	DESCRIPTION
NC	04/16/04	MC	ORIGINAL DRAWING

C:\John2\BASIN WATER\CAD\BW STANDARD DRAWINGS\1300 GPM Unit\Construction\A.1.2.12-AirVACAssyRevNC.dwg, 5/12/2004 9:21:15 AM









NOTE:
SEE DWG. CH-C.3.6
FOR BOM

REV	DATE	BY	DESCRIPTION
NC	05/06/04	CDC	ORIGINAL DRAWING

SCALE: 1:2

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

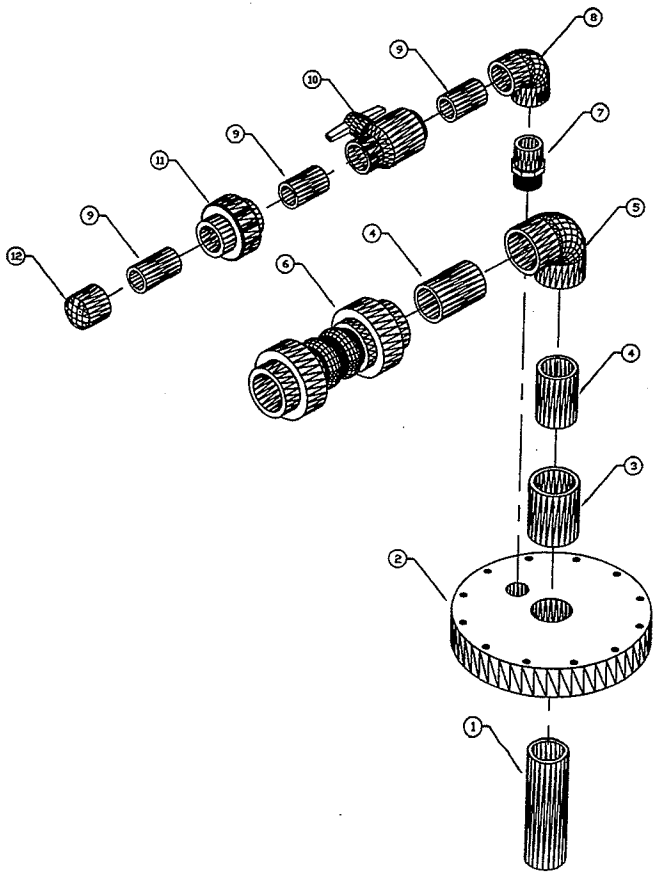
ALL DIMENSIONS ±1/8" UNLESS OTHERWISE SPECIFIED

Basin Water

BASIN WATER MANUFACTURING DESIGN

VESSEL CLOSURE ASSEMBLY

STD.
SHEET
CH-C.3.5
SHEET OF



ITEM	QTY.	DESCRIPTION
1	1	1½"X6" CUT PIPE THREADED ON ONE END
2	1	PENTAIR VESSEL CLOSURE
3	1	1½" COUPLER (SXS)
4	2	1½"X2½" CUT PIPE
5	1	1½" 90° ELBOW (SXS)
6	1	1½" EXPANSION JOINT
7	1	1" ADAPTER (SPXM)
8	1	1" 90° ELBOW (SXS)
9	3	1"X2½" CUT PIPE
10	1	1" BALL VALVE (SXS)
11	1	1" UNION (SXS)
12	1	1" CAP (S)

REV	DATE	BY	DESCRIPTION
NC	04/22/04	CDC	ORIGINAL DRAWING

SCALE: 1:2

WARNING 0 1/2 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED

DRAWN

CHECKED

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ALL DIMENSIONS ±1/8" UNLESS OTHERWISE SPECIFIED

Basin Water

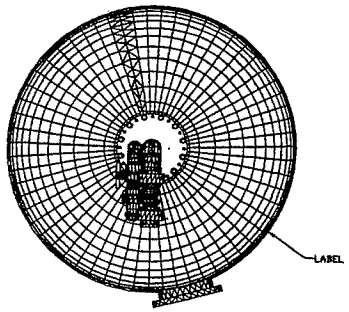
BASIN WATER MANUFACTURING DESIGN

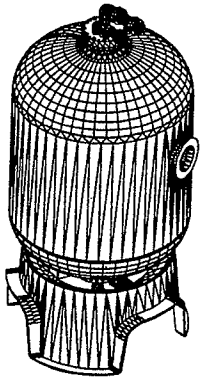
VESSEL CLOSURE ASSY EXPLODED

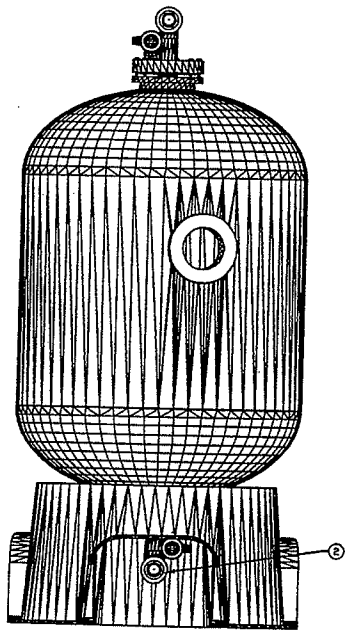
STD.

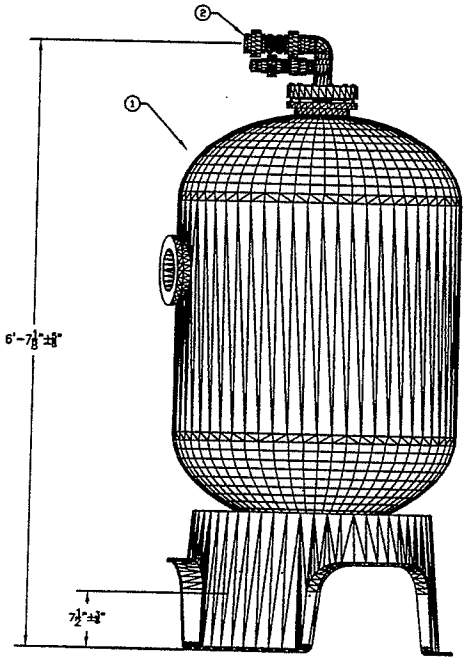
SHEET CH-C.3.6

SHEET OF









ITEM	QTY.	DESCRIPTION
1	1	VESSEL AND STAND ASSY.
2	2	VESSEL CLOSURE ASSY. (DWG. CH-C.3.5)

REV	DATE	BY	DESCRIPTION
JKC	04/27/04	JKC	ORIGINAL DRAWING OPTION 2

SCALE: 1:8

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

Basin Water

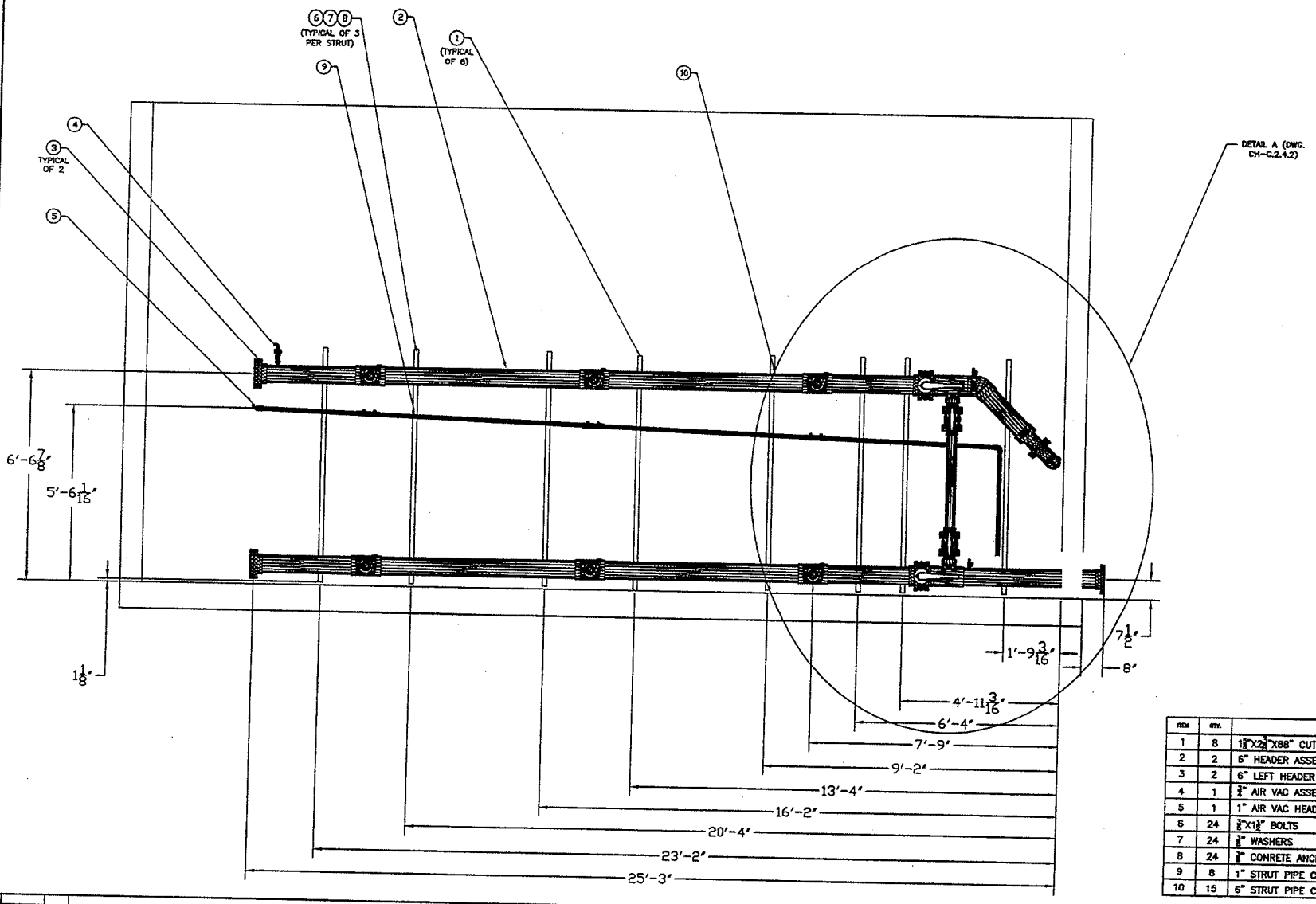
BASIN WATER MANUFACTURING DESIGN

VESSEL ASSEMBLY LAYOUT

STD.

SHEET CH-C.3.1

SHEET OF



mk	qty.	DESCRIPTION
1	8	1 5/8"X2 3/4"X88" CUT STRUT
2	2	6" HEADER ASSEMBLY (DWG. CH-C.2.1)
3	2	6" LEFT HEADER END ASSEMBLY (DWG. CH-.5.1)
4	1	3/4" AIR VAC ASSEMBLY (DWG. A.1.2.12)
5	1	1" AIR VAC HEADER (DWG. CH-C.2.1.1)
6	24	3/8"X1 1/2" BOLTS
7	24	3/8" WASHERS
8	24	3/8" CONRETE ANCHORS
9	8	1" STRUT PIPE CLAMPS
10	15	6" STRUT PIPE CLAMPS

NO	DATE	BY	DESCRIPTION
NC	04/27/04	JKZ	ORIGINAL DRAWING OPTION 2
REV	DATE	BY	DESCRIPTION

SCALE: 1:8

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

ALL DIMENSIONS ±1/8" UNLESS OTHERWISE SPECIFIED

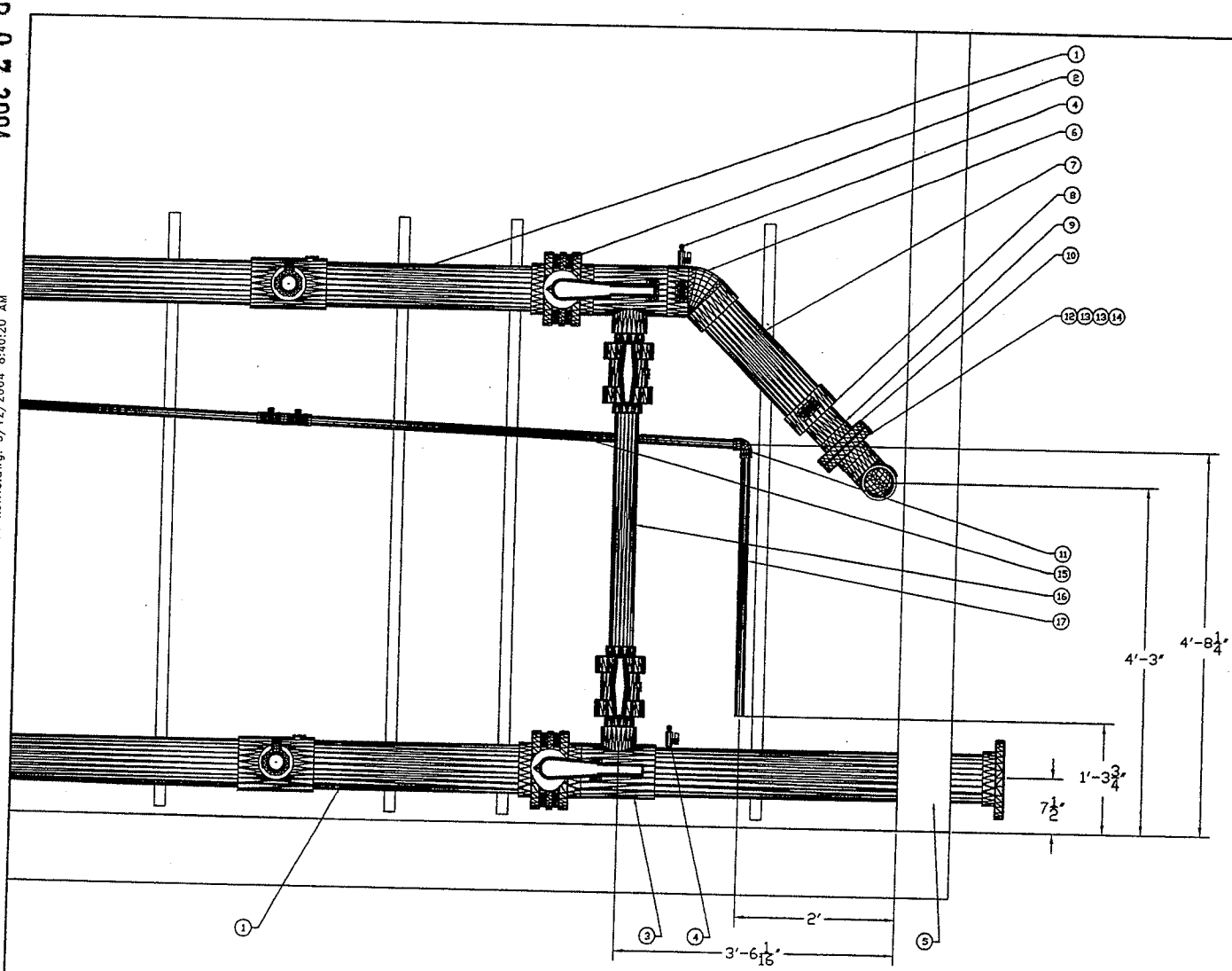
Basin Water

BASIN WATER MANUFACTURING DESIGN

STRUT CHANNEL AND HEADER INSTALLATION

CH

SHEET CH-C.2.4.1 OF SHEETS



ITEM	QTY.	DESCRIPTION
1	2	6"X___" SCHEDULE 80 CUT PIPE
2	1	TOP HEADER INTERCONNECT (DWG. CH-A.5.2)
3	1	BOTTOM HEADER INTERCONNECT (DWG. CH-A.5.3)
4	2	1" SAMPLE VALVE ASSEMBLY (DWG. CH-A.5.4)
5	1	6"X___" SCHEDULE 80 CUT PIPE
6	1	45° ELBOW (SXS)
7	1	6"X___" SCHEDULE 80 CUT PIPE
8	1	6"X4" BELL REDUCER (SXS)
9	1	4"X4" SCHEDULE 80 CUT PIPE
10	1	4" VAN STONE FLANGE
11	1	1" 90° ELBOW (SXS)
12	8	3/8"X3 1/2" BOLTS
13	16	3/8" WASHER
14	8	3/8" NUTS
15	1	1"X___" CUT PIPE
16	1	3"X___" CUT PIPE
17	1	1"X___" CUT PIPE

REV	DATE	BY	DESCRIPTION
NC	04/27/04	JKZ	ORIGINAL DRAWING OPTION 2

SCALE: 1:8

WARNING: 0 1/2 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN
CHECKED

ALL DIMENSIONS ±1/8" UNLESS OTHERWISE SPECIFIED

Basin Water

BASIN WATER MANUFACTURING DESIGN

STRUT CHANNEL AND HEADER INSTALLATION DETAIL A

CH

SHEET CH-C.2.4.2 OF SHEETS

Campo Hills

Disposable Resin Ion Exchange System
Engineering Submittal

SECTION 5

- Resin NSF Approval
- Resin MSDS Data

ANSI/NSF International Standard for Drinking Water Additives

ANSI/NSF Drinking Water System Components - Health Effects

This Standard establishes minimum health effects requirements for the chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems. This Standard does not establish performance, taste and odor, or microbial growth support requirements for drinking water systems products, components, or materials.

Rohm and Haas Company

100 Indepence Mall West
Philadelphia , PA 19106-2399
(215) 592-2557
(215) 409-4534

Model	Water Contact Temp	Water Contact Material
Product Type: Process Media		
PWA1	CLD 23	SYN
PWA2	CLD 23	SYN
PWA402	CLD 23	SYN
PWA555	CLD 23	SYN

Back

MATERIAL SAFETY DATA SHEET
Rohm and Haas Company

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

AMBERLITE PWA402

Product Code : 76391
Key : 864536-2

MSDS Date : 07/10/98

COMPANY IDENTIFICATION

ROHM AND HAAS COMPANY
100 INDEPENDENCE MALL WEST
PHILADELPHIA, PA 19106-2399

EMERGENCY TELEPHONE NUMBERS

HEALTH EMERGENCY : 215-592-3000
SPILL EMERGENCY : 215-592-3000
CHEMTREC : 800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

No		CAS REG NO	WEIGHT (%)
1	Quat amine divinylbenzene/styrene copolymer, Cl ion form	60177-39-1	44 - 48
2	Water	7732-18-5	52 - 56

See Section 8, Exposure Controls / Personal Protection

3. HAZARDS IDENTIFICATION

Primary Routes of Exposure

Skin Contact
Eye Contact

Eye Contact

Material can cause the following:
- slight irritation

Skin Contact

Prolonged or repeated skin contact can cause the following:
- slight skin irritation

4. FIRST AID MEASURES

Eye Contact

Flush eyes with a large amount of water for at least 15 minutes. Consult a physician if irritation persists.

Skin Contact

Wash skin thoroughly with soap and water.

5. FIRE FIGHTING MEASURES

Flash Point	Not Applicable
Auto-ignition Temperature	>500°C/>932°F Estimate
Lower Explosive Limit	Not Applicable
Upper Explosive Limit	Not Applicable

Unusual Hazards

Combustion generates toxic fumes of the following:
- nitrogen oxides - hydrogen chloride

Extinguishing Agents

Use the following extinguishing media when fighting fires involving this material:
- carbon dioxide - dry chemical - water spray

Personal Protective Equipment

Wear self-contained breathing apparatus (pressure-demand MSHA/NIOSH approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Protection

Wear gloves made of the following material:
- cotton, canvas or leather
Additional personal protective equipment should include the following:
- safety glasses (ANSI Z87.1 or approved equivalent)

Procedures

Floor may be slippery; use care to avoid falling. Transfer spilled material to suitable containers for recovery or disposal.

7. HANDLING AND STORAGE

Storage Conditions

Avoid repeated freeze-thaw cycles; beads may fracture. If frozen, thaw at room temperature.

Handling Procedures

NOTE: This product as supplied is a whole bead ion exchange resin and may produce slight eye irritation. However, the ground form of this ion exchange resin should be treated as a severe eye irritant. Worker exposure to ground resins can be controlled with local exhaust ventilation at the point of dust generation, or use of suitable personal protective equipment(dust/mist air-purifying respirator and safety goggles).
Properly designed equipment is vital if these resins are to be used in conjunction with strong oxidizing agents such as nitric acid to prevent a rapid build-up of pressure and possible explosion. Consult a source knowledgeable in the handling of these materials before proceeding. Do not pack column with dry ion exchange resins. Dry beads expand when wetted; this expansion can cause glass columns to shatter.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limit Information

No		CAS REG NO	WEIGHT (%)
1	Quat amine divinylbenzene/styrene copolymer, Cl ion form	60177-39-1	44 - 48
2	Water	7732-18-5	52 - 56

Comp. No.	Units	ROHM AND HAAS TWA	ROHM AND HAAS STEL	OSHA TWA	OSHA STEL	ACGIH TWA	ACGIH STEL
1		None	None	None	None	None	None
2		None	None	None	None	None	None

Respiratory Protection

A respiratory protection program meeting OSHA 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use. None required under normal operating conditions.

Eye Protection

Use safety glasses (ANSI Z87.1 or approved equivalent).

Hand Protection

Avoid skin contact. When using this substance, use skin protection. - Cotton, canvas, or leather gloves
Gloves should be removed and replaced immediately if there is any indication of degradation or chemical breakthrough.

Engineering Controls (Ventilation)

The ventilation system employed is dependent on the user's specific application of this material. Refer to the current edition of Industrial Ventilation: A Manual of Recommended Practice published by the American Conference of Governmental Industrial Hygienists for information on the design, installation, use, and maintenance of exhaust systems. None required under normal operating conditions.

Other Protective Equipment

Facilities storing or utilizing this material should be equipped with an eyewash facility.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear
State	Beads
Odor Characteristic	Amine odor
Viscosity	Not Applicable
Specific Gravity (Water = 1)	1.05
Vapor Density (Air = 1)	< 1 Water
Vapor Pressure	17 mm Hg @ 20°C/68°F Water
Melting Point	0°C/32°F Water
Boiling Point	100°C/212°F Water
Solubility in Water	Practically insoluble
Percent Volatility	52 to 56 % Water

Evaporation Rate (BAc = 1) ..... < 1 Water

See Section 5, Fire Fighting Measures

10. STABILITY AND REACTIVITY

Instability

This material is considered stable under specified conditions of storage, shipment and/or use. See SECTION 7, Handling And Storage, for specified conditions. However, avoid temperatures above 190C.

Hazardous Decomposition Products

Thermal decomposition may yield the following:
- monomer vapors - alkylamines - oxides of nitrogen - hydrogen chloride

Hazardous Polymerization

Product will not undergo polymerization.

Incompatibility

Avoid contact with strong oxidizing agents, particularly concentrated nitric acid.

11. TOXICOLOGICAL INFORMATION

Acute Data

Toxicity data for a compositionally similar material are listed below.

Oral LD50 - rat: >5000 mg/kg
Dermal LD50 - rabbit: >5000 mg/kg

Mutagenicity Data

Ames mutagenicity: Non-mutagenic

12. ECOLOGICAL INFORMATION

No Applicable Data

13. DISPOSAL CONSIDERATIONS

Procedure

Unused resin may be incinerated or landfilled in facilities meeting local, state, and federal regulations. For contaminated resin, the user must determine the hazard and use an appropriate disposal method.

14. TRANSPORT INFORMATION

US DOT Hazard Class ..... NONREGULATED

Campo Hills

Disposable Resin Ion Exchange System
Engineering Submittal

SECTION 6

- Residual Management

BasinWater

Date: July 20, 2004

To: S. Matthews
County of San Diego WWM

Via E-Mail: steve.mattews@sdcounty.ca.gov

From: O. A. Carreño

RE: Campo Hills – Residual Management

The only residual requiring special attention that will be generated by the BasinWater (Campo Hills) water treatment system is the spent ion exchange resin. Once the resin has reached its adsorption capacity, i.e. the predetermined numbers of bed volumes (BVs) of water have been treated; the resin is removed from the adsorption vessel and replaced with virgin resin. The spent resin will be removed by trained personnel, and packaged in DOT approved containers.

Initially, the packaged resin will remain at the Campo Hills site for sampling and analytical for the characterization purposes. The requested analysis will be done in accordance to the requirements specified under 40 CFR 261(Federal) and CCR Title 22 (California), as well as the *Waste Acceptance Criteria* established by the disposal facility. Only certified laboratories will be used to perform the required analytical. The disposal company identified for disposal of the spent resin material is American Ecology Corporation (www.americanecology.com) at their Grandview, ID facility.

Upon completion of the chemical analysis, the "Generator Waste Product Questionnaire" and "Waste Acceptance Criteria Addendum" forms will be completed, executed by the system operator (Generator) and submitted for approval to AEC. Once approval is obtained by AEC, the waste material can be shipped for disposal. Only DOT and EPA certified approved haulers will be contracted to transport the waste stream to the final destination facility. The hauler used will depend on their shipping schedule, facility location, pick-up frequency, and favorable rates.

The AEC approval is good for 1 year, and recertification is done thereafter with the submittal of new analytical.

As a reminder, Basin's role is to help in the coordination of the resin replacement, characterization, transportation and disposal of the waste material. It is the generator's responsibility to review all paperwork for completeness, and execute these in accordance to the requirements.

Cc: J. Houston – Campo Hills

8731 Prestige Court, Rancho Cucamonga, CA 91730 Tel. (909) 481-6800 Fax (909) 481-6801 www.basinwater.com

WASTE ACCEPTANCE CRITERIA ADDENDUM

Generator:_____ **Date:**_____

Contact:_____ **Phone:**_____

Common Name of Material:_____

Description:_____

Identify which table applies to the material (see below):_____

Comments:_____

_____

Determine which table, from the USEI Waste Acceptance Criteria (WAC), applies to the waste you intend to ship to USEI. (Tables 1 - 4).

1. If Table 1 applies, does the material only contain U_{238} or only Th_{232} or both?

a.) If only U_{238} or only Th_{232}, is present, then use the value/concentration listed under Table 1 for Natural Uranium and Natural Thorium as the limit.

b.) If both are present, then use the following formulas as appropriate:

For natural uranium and natural thorium mixture:
{Conc. U / 141 pCi/g + Conc. Th / 110 pCi/g} ≤ 1 and {(pCi/g U x 14) + (pCi/g Th x 10)} = $\leq$ 2000 pCi/g

For refined uranium and thorium mixture:
{Conc. U / 333 pCi/g +Conc Th/110} ≤ 1 and {(pCi/g U x 5) + (pCi/g Th x 10)} = $\leq$ 2000 pCi/g

For depleted uranium and thorium mixture:
{Conc. U / 169 pCi/g + Conc Th / 110 pCi/g} ≤ 1 and {(pCi/g U x 4) + (pCi/g Th x 10)} = $\leq$ 2000 pCi/g

Note: Absent strong evidence to the contrary, Th-232 will routinely be considered to be in 100% equilibrium with its progeny.

Calculations (add extra sheets as necessary)

c.) If Th-230 is the only source material present, then choose the appropriate limit from the two available selections.

2. If Table 2 applies then choose one of the following:

a) Is the material Radium 226 or 228?

Note: Ra-226 and Ra-228 will routinely be considered completely in equilibrium with their progeny.

If yes, use Table 2 directly

b) Is the material Lead 210?
Note: Lead-210 will routinely be considered completely in equilibrium with its progeny.

If yes, use Table 2 directly

c) Is the material anything other than NORM?

If yes, use Table 2 directly

3. If Table 3 applies , then

Use Table 3 directly

Note: You must provide an inventory estimate of the radioactive content of each container. (Please list by isotope.)

Radioactive Estimate by Container and Isotope:_____

_____

_____

Note: You can add additional sheets, if necessary

4. If Table 4 applies, then

Use Table 4 directly

Note: You must provide an inventory estimate of the radioactive content of each container. (Please list by isotope.)

Radioactive Estimate by Container and Isotope:_____

_____

_____

When using Table 4 please note the following:

1. Material must be transported in a closed vehicle.
2. Material must be packaged in a manner that does not require class 7 placarding of vehicle
3. Individual packages can bear White I or Yellow II Labels but no Yellow III Labels(surface dose rate > 50 mrem/hr). Contact a Customer Service Representative or Sales Representative if you need help with packaging requirements. Depending on the scope, USEI may charge for this service.
4. Provide specific reference for NRC exemption

NRC Exemption: _____

Placarding Required?_____ If yes, what type_____

Certification Statement: I certify that the contents of the packages being shipped to US Ecology Idaho (USEI) are exempt from regulation by the US Nuclear Regulatory Commission in accordance with 10CFR (list each section of the NRC regulations that contains an exemption for each type of device or item in the shipment)

_____

Name/Title (Please Print)

_____ _____

Signature Date

WSID # ☐☐☐☐☐ ☐☐☐☐

AE American Ecology Corporation

GENERATOR WASTE PRODUCT QUESTIONNAIRE

☐**US Ecology Idaho, Inc.**
P.O. Box 400
10.5 Miles NW on Hwy 78, Lemley Road
Grand View, Idaho 83624
(800) 274-1516, (208) 834-2275
Fax: (208) 834-2919
EPA ID#: IDD073114654

☐**US Ecology (Beatty, NV)**
P.O. Box 578
Highway 95, 11 miles South of Beatty
Beatty, NV 89003
(800) 239-3943, (775) 553-2203
Fax: (775) 553-2125
EPA ID#: NVT330010000

☐**US Ecology Texas**
P.O. Box 307
3.5 Miles S on Petronila Road
Robstown, TX 78380
(800) 242-3209, (361) 387-3518
Fax: (361) 387-0794
EPA ID#: TXD069452340

SECTION A – GENERAL INFORMATION

1 a. Generator ____ RCRA Status: ☐CESQG, ☐SQG, ☐LQG

Mailing Address ____ City/State ____ ZIP ____

Shipping Address ____ City/State ____ ZIP ____

1 b. Tech./Off-Spec Contact ____ (WHEN TRUCK ARRIVES AT FACILITY) TEL ____ FAX ____

24 HR. 7 Day/Week Contact ____ TEL ____ FAX ____

Email ____

U.S. EPA IDENTIFICATION NUMBER ☐☐☐☐☐☐☐☐☐☐☐☐

STATE IDENTIFICATION NUMBER (if applicable) ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

2. Billing/Broker ____

Address ____ City/State ____ ZIP____

Billing Contact ____ TEL ____ FAX ____
Email

SECTION B – WASTE CHARACTERIZATION

1. **Common Name for This Waste:** ____
2. **Detailed Process Generating Waste:** (If insufficient space attach Facility Process Letter Form) ____

3. **Annual Quantity:** ____ ☐Tons, ☐Yards, ☐Gallons, ☐Drums
4. **Shipment Duration:** ☐Permanent *(1 Year or Longer)*, ☐Temporary *(Less Than 1 Year)*, ☐One time only Shipment Frequency: ____
5. **Shipment Mode:** ☐Bulk ☐Palletized Boxes ☐Woven Cloth Bags ☐Drums ☐Buckets ☐Overpacks ☐Other____ Size: ____

SECTION C - PHYSICAL PROPERTIES

1. **Does the waste pass the EPA specified paint filter test?** ☐Yes (Solid); ☐No(Free liquids present)
   Describe Physical Appearance of Waste: (include color, texture, be specific) ____
3. **Ignitable** per 40 CFR 261.21? ☐Yes, ☐No ☐N/A. Flashpoint (for liquids/sludges) ____°F. (Closed Cup)
4. **Reactive**, per 40 CFR 261.23? ☐Yes, ☐No **If yes**, check if waste reacts when exposed to: ☐Air, ☐Water, ☐Friction
5. **pH Range:** ____ to ____ **5.1 Actual pH:** ____ (Facility typically tests pH when truck arrives) **5.2** ☐N/A
6. **Describe Odor of Waste:** ☐None, ☐Slight, ☐Strong, Describe: ____
7. **Viscosity (Liquids): Similar to:** ☐Water, ☐ Motor Oil, ☐Honey
8. **Potential for presence/Separation of incidental liquids due to transport:** ☐Yes ☐No ☐N/A (Answer will eliminate delays when load arrives)

SEP 0 7 2004

WSID # ☐☐☐☐☐ ☐☐☐☐

9. **Thermal Treatment:** ☐Yes, ☐No (If Yes, answer the questions below)
Is the waste from a soil remediation site and subject to 40 CFR 268.49 Alternative Standards for Soil? ☐ Yes ☐ No
Waste Type: Soil, If Soil please specify % of: Sand_____ Silt_____ Clay_____ Top Soil_____
☐Filtercake, ☐Tank Bottoms, ☐Sludge, ☐Industrial Process Waste, ☐Coal Tar
☐Absorbent % _____ Note: must be Non-biodegradable
Moisture Content _____ Grain Size_____ TPH: _____
Debris Content: Please specify the overall % of debris: _____
☐Rocks Size_____ %_____ ☐Wood Size__ %_
☐Concrete Size_____ %_____ ☐Plastic Size__ %_
☐Ashpalt Size _____% _____ ☐Other Size _____ %_____
Description: _____

SECTION D – CHEMICAL/PHYSICAL COMPOSITION

1. Knowledge is from: ☐Lab Analysis ☐MSDS ☐Process/Generator knowledge ☐Other (specify)_____
Copies of all analyticals, *lab reports and/or Material Safety Data Sheets* ***must be attached*** *to this application.*

List all potential TRI chemicals, including CAS# and concentration, using additional sheets as necessary. List **all physical** (e.g, % soil, % debris and size, water, etc) and **regulated chemical** components (e.g., conc. of Arsenic, Benzene etc.) within the waste.

CAS#	Component	Typical or lab value	Units	Range			TCLP Yes/No
					to		
					to		
					to		
					to		
					to		
					to		
					to		
					to		
					to		
					to		

SECTION E - WASTE CLASSIFICATION

1. **Waste as shipped will be:** ☐RCRA HAZARDOUS ☐NON-HAZARDOUS ☐ INDUSTRIAL ☐CERCLA
☐UNIVERSAL ☐TSCA ☐STATE REG
2. **RCRA EPA Waste Code(s) from 40 CFR 261:** ☐ NON RCRA

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐
☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

(attach additional pages as needed)

Form Code ☐☐☐☐ Source Code ☐☐☐☐ Manag Code ☐☐☐☐ SIC / NAICS Code ☐☐☐☐☐☐

3. **State Waste Codes, if applicable: State of:** ____ **Codes:**

☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐

4. **Does Waste Exhibit or Contain the Following:**

EXPLOSIVE	☐Yes	☐No	INFECTIOUS	☐Yes	☐No	PCBs	☐Yes ☐No
SHOCK SENSITIVE	☐Yes	☐No	THERMALLY UNSTABLE	☐Yes	☐No	SULFIDE	☐Yes ☐No
PYROPHORIC	☐Yes	☐No	RADIOACTIVE**	☐Yes	☐No	CYANIDE	☐Yes ☐No
WATER REACTIVE	☐Yes	☐No	EXEMPT RAD**	☐Yes	☐No	PEROXIDE	☐Yes ☐No
COMPRSD GASES	☐Yes	☐No	TIRES	☐Yes	☐No		

**Additional Radiological information is provided in USEI's WAC Addendum.

WSID # ☐☐☐☐☐ ☐☐☐☐

SECTION F – U.S. DOT SHIPPING DESCRIPTION

(Note - Shipper is responsible for correctness of this information)

1. Hazardous Material? ☐Yes, ☐No 2. RQ Required: ☐Yes, ☐No, ☐N/A. If yes, give RQ amount:_____
3. Proper D.O.T. Shipping Name: _____
4. Hazard Class: _____ 5. UN/NA_____ 6. Packaging Group: _____
7. Additional Description: _____

SECTION G – CERTIFICATION

1. Has this waste been treated (per 40 CFR 260.10) after the initial point of generation as a waste? ☐Yes, ☐No (If No, go to 2)
   1a. Indicate treatment method: ☐Solidification, ☐Stabilization, ☐Other: _____
   1b. If solidified or stabilized list all additives: _____
2. Per the requirements of 40 CFR 264.1080 (Subpart CC), at the point of generation, does this waste contain less than 500 ppm VOCs?
   ☐Yes, ☐No ☐N/A.
3. The total 40 CFR 268, Appendix III Halogenated Organic Compounds present in this waste, as shipped to Facilities are at the following levels?
   ☐None Present, ☐0 to 99 mg/kg, ☐100 to 499 mg/kg, ☐500 to 999 mg/kg, ☐>1000 mg/kg
4. **Is this waste, or the generating facility, subject to regulation under 40 CFR Part 61 Subpart FF (Benzene Rule) of NESHAPS (58 FR No. 4 - 1/7/93)** (Note: Waste generated from chemical manufacturing, coke-by-product recovery plants, petroleum refineries or treaters of such waste are subject to these requirements). ☐Yes, ☐No
5. Is the waste **restricted** under the Land Disposal Restrictions under federal rules of 40 CFR 268. ☐ Yes ☐No (If yes, please answer the following:)
   5a. Treatment Sub-category: ☐Wastewater (<1 % TSS and <1% TOC), ☐Non-wastewater, ☐Debris
   5b. I certify that this material may be directly land disposed without further treatment. ☐Yes, ☐No
   If yes, specify: ☐Meets numerical BDAT treatment standards by analysis, which are attached.
   ☐Material or debris has been treated by this technology from 40 CFR 268.42: _____
   ☐Material is subject to a variance or extension as specified: _____

   5c. Per 40 CFR 268.2(i) and 268.7(a) there are "underlying hazardous constituents" (UHC) applicable from the UTS list under 40 CFR 268.48.
   ☐Yes, ☐No If Yes, list UHCs: _____
6. GENERATOR CERTIFICATION STATEMENTS

   A. For Solids for Direct Burial at Facility:

   1. The waste was initially generated as a solid material containing no free liquid.

   — OR —

   2. The waste was initially generated as a liquid or waste containing free liquids. The waste has been treated to eliminate free liquids in compliance with Section 3004 (c) of the Resource Conservation and Recovery Act (RCRA) of 1976, as amended by the Hazardous and Solid Waste Amendments of 1984. The materials used in the treatment process do not biodegrade or release liquids when compressed. The treatment process utilized (for bulk waste) did not employ the addition of absorbents to the waste (unless used in a stabilization process).

   B. Certification Statement: I hereby certify that as an authorized representative of the generator named above, all information submitted in this and all the attached document are true and accurate. Pre-shipment and all other samples provided are a true representative sample of the waste and were sampled in accordance with 40 CFR Part 261.20. Any analysis of the waste was conducted in accordance with the approved test methods in 40 CFR Part 261 on a representative sample as defined in 40 CFR Part 261.20. To the best of my knowledge, all known (40 CFR Part 261/OSHA/NESHAP) and suspected hazardous components have been included in this documentation. All material, descriptions, and packaging will comply with all current regulations.

   SIGNATURE: _____ TITLE: _____ DATE: _____
   TO BE SIGNED BY A GENERATOR OR APPROVED GENERATOR REPRESENTATIVE.
   PRINTED NAME: _____

FACILITY USE ONLY

Comments: _____

Initial Review: _____ Second Review: _____ Final Review: _____

Date Approved: _____ Date Denied: _____

See WPQ summary sheet for fingerprints and waste routing.

Disposal of Water Treatment Plant Waste Containing Radionuclides

Options for Disposal are Influenced by. . .

- Concentration of radionuclides and co-occurring contaminants in the waste stream
  - Hazardous Waste
  - Technologically Enhanced Naturally Occurring Radioactive Material (TENORM)
  - Low-Level Radioactive Waste (LLRW)
  - Mixed Waste
- Federal, State, & Local Regulations
  - Disposal facility policies
- Type of residuals
  - Liquid or solid

Definitions for Waste

Hazardous Waste
Technologically Enhanced Naturally Occurring Radioactive Material (TENORM)
Low-Level Radioactive Waste (LLRW)
Mixed Waste

Hazardous Waste

- Regulated under RCRA
- Hazardous waste is solid waste:
  - Not excluded from regulation under 40 CFR 261.4(b)
  - Exhibits toxicity, corrosivity, reactivity, or ignitability criteria listed under 40 CFR 261.3(a)(2) and (b)
- Presence of radionuclides does not *ITSELF* make the waste hazardous

TENORM

- Regulated by numerous federal regulations
- Defined as naturally occurring materials whose radionuclide concentrations or potential for exposure is enhanced as a result of human activities
  - Includes waste streams generated by water treatment plants
  - Also includes mining, fertilizer production, and oil and gas production.

LLRW

- Defined by The Low-Level Radioactive Waste Policy Act
  - Not high level radioactive waste, spent nuclear fuel, or byproduct material; and,
  - The Nuclear Regulatory Commission (NRC)...classifies as LLRW

LLRW

- Can contain source or special nuclear material
  - Radium (Ra) is not source or byproduct material by definition
  - Uranium (U) & thorium (Th) are source material and may be subject to NRC licensing requirements

HOWEVER. . .

LLRW: Uranium & Thorium

- If U or Th makes up <0.05% by weight (totaling less than 15 lbs.), it is source material an "unimportant quantity" and exempt from NRC Regulations
  - Approximately 335 pCi/g for natural U

Mixed Waste

- Regulated under RCRA and the Atomic Energy Act (AEA)
  - Contains both hazardous waste and source. . . or byproduct material subject to the AEA

>0.05% U/TH by weight (totaling <15 lbs.)	+	Hazardous Waste	=	Mixed waste subject to general license from NRC or Agreement State
>0.05% U/TH by weight (totaling >15 lbs.)	+	Hazardous Waste	=	Mixed waste subject to specific license from NRC or Agreement State

Statutes and Regulations

RCRA

SDWA

AEA/NRC

CWA

DOT

State Requirements

Things to Consider

- Numerous federal regulations
  - No federal waste disposal regulation specifically for TENORM
- Key definitions vary among regulations
- States, locality, and waste disposal facility may have additional requirements

RCRA
42 USC 6901 et. seq.

- The identification, management, and disposal of solid wastes (including sludge)
- If you generate solid waste, you must determine whether the waste is hazardous
  - Use a method described in 40 CFR 262.11

RCRA: Hazardous Waste

- Solid waste exhibiting toxicity, corrosivity, reactivity, or ignitability characteristics is hazardous
- Requirements depend on the amount of hazardous waste produced monthly and the amount of hazardous waste stored on site at any given time
  - Large Quantity, Small Quantity, or Conditionally Exempt Small Quantity
- "Cradle to Grave" liability

RCRA

- RCRA Subtitle C requirements apply to hazardous waste disposal
  - Hazardous Waste Landfill
  - LLRW Landfill
- RCRA Subtitle D requirements apply to non-hazardous waste solid waste disposal
  - Municipal Solid Waste Landfill (MSWLFs) requirements
    - Some MSWLFs can accept commercial solid waste, nonhazardous sludge, CESQG waste, and industrial nonhazardous solid waste
  - Hazardous Waste Landfill
  - LLRW Landfill

Clean Water Act (CWA)
33 USC 1251 to 1387

- Direct discharges under a National Pollutant Discharge Elimination System (NPDES) permit
- Discharges to a publicly owned treatment works (POTW)
- Federal NPDES regulations do not set specific limits on radionuclides in discharges
- EPA regulations on the use and disposal of the sewage sludge produced by POTWs currently do not cover radioactive material

CWA

- Systems should:
  - Contact the state NPDES program to determine if the system needs an NPDES or other permit
  - Contact the state NPDES program to determine if the system is capable of meeting the applicable local limits
  - Contact their POTWs to ensure that the wastes will be accepted

SDWA
42 USC 300f et seq.

- EPA required to develop minimum requirements for underground injection control (UIC) programs
- Stay tuned. . .

DOT Regulations
49 CFR 171 to 180

- Govern shipping, labeling, and transport of hazardous materials
- DOT definition of hazardous includes radioactive materials

HOWEVER. . .

DOT: Exemptions

- DOT exempts, "other natural materials or ores... when these have been subjected to physical or chemical processing, when the processing was not for the purpose of extracting radionuclides...provided that their radionuclide concentration does not exceed 10 times the activity concentration in the table in 40 CFR 173.436."
- For example
  - Uranium is listed in the table in 40 CFR 173.436 at 27 pCi/g
  - Radium-226 and -228 are listed at 270 pCi/g
    - Therefore, a system would need to transport over 270 pCi/g of uranium or 2,700 pCi/g of radium before meeting the "10 times" exemption threshold

AEA
42 USC Chapter 23

- AEA regulates the development and use of nuclear facilities, and the creation, generation, and disposal of source, special nuclear, and byproduct material
- Uranium and thorium are source material
  - NRC has exempted some source material
    - Uranium or thorium makes up <0.05% by weight

State TENORM Regulations

- Currently regulated by 13 states
- http://www.tenorm.com/regs2.htm#States

Residual Type

Solid Residuals

Liquid Residuals

Waste Streams

- Liquid Residual Stream
  - Brine
  - Backwash Water
  - Rinse Water
  - Acid Neutralization Water
  - Concentrate
- Solids
  - Spent Resins
  - Spent Filter Media
  - Spent Membranes
  - Sludges

Solid Residuals by Treatment Type

Treatment	Spent Resins/ Media	Spent Membranes	Sludge
IX	X		
RO		X	
AA X			
Coagulation/Filtration	X		X
Lime Softening	X		X
Green Sand Filtration	X		X
Co-Precipitation w/Barium Sulfate	X		X
Electrodialysis/Reversal		X	
Pre-formed Hydrous Manganese Oxide Filtration	X		X

Liquid Residuals by Treatment Type

Treatment	Brine	Backwash	Rinse Water	Acid Neutral Water	Concentrate
IX	X	X	X		
RO					X
AA		X	X	X	
Coagulation/Filtration		X			
Lime Softening		X			
Green Sand Filtration		X			
Co-Precipitation w/Barium Sulfate		X			
Electrodialysis/Reversal					X
Pre-formed Hydrous Manganese Oxide Filtration		X			

Disposal Options

Direct Discharge
Discharge to POTW
Underground Injection
Landfill

Disposal Options

Residual Waste	Disposal Options				
	Direct Discharge	Discharge to POTW	Recycle	Underground Injection	Landfill
Liquids	**X**	**X**	**X**	**X**	
Sludge					**X**
Spent Media					**X**
Spent Membranes					**X**

Other Options?

- Incineration
- Evaporation ponds
- Surface impoundments
- Sludge dewatering

} Intermediate processing methods each creating its own residual stream

- Landspreading or soil mixing

} Not encouraged unless there is a demonstrated benefit and the benefits are weighed against potential hazards & risks

Liquids: Direct Discharge

- CWA
- Need accessible and appropriate receiving body
- Must have a National Pollutant Discharge Elimination System (NPDES) permit

- Federal NPDES regulations do not set specific limits on radionuclides in discharges but:
  - State anti-degradation policies
  - Source water protection policies
  - Co-occurring contaminant limits set in NPDES

May limit the use of this disposal option

Liquids: POTW

- Discharges to a POTW
  - POTW will have NPDES permit
  - System may need local permit or contract
  - Both the system and the POTW are responsible for:
    - Preventing the introduction of any pollutants that may interfere with the POTW treatment process, contaminate POTW sewage sludge, or violate POTWs NPDES permit
    - Meeting technically based local limits (TBLLs)
    - Meeting pretreatment regulations
- POTW owners can refuse to accept waste

Solids: Landfill

- Determine if the waste is hazardous through knowledge of the waste generation process, analytical testing, or both
  - Toxicity Characteristic Leaching Procedure (TCLP) (EPA Method 1311)
- Determine if waste contains any "free liquids"
  - Perform the Paint Filter Liquids Test (or PFLT; EPA SW 846 Method 9095)
  - Conduct intermediate processing to remove any liquids
- No federal requirement to test residuals specifically for radionuclides
- No specific federal regulation governing landfill disposal of water treatment plant solids or sludges containing TENORM

Solid Waste Landfill

- Municipal solid waste landfills may accept:
  - Non-hazardous, solid, TENORM wastes from all water systems
  - Hazardous waste from Conditionally Exempt Small Quantity Generators
- Industrial solid waste landfills may also accept:
  - Non-hazardous solid TENORM waste

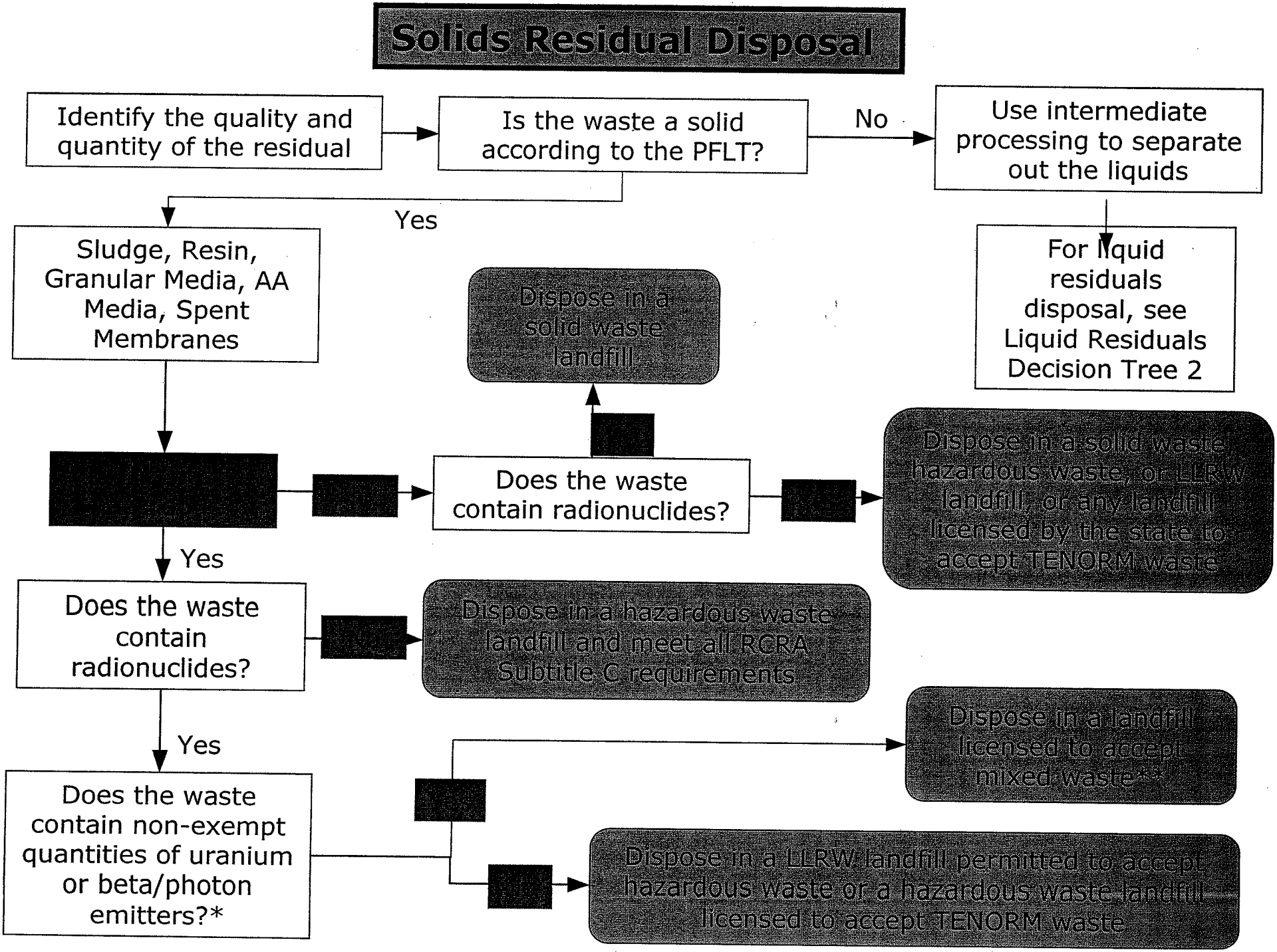
Hazardous Waste Landfill

- May accept hazardous waste from all generator classes
  - Hazardous waste from Large and Small Quantity Generators must meet RCRA Land Disposal Restriction requirements (40 CFR 268.40)
- Some hazardous waste landfills have explicit permit conditions while others may have to request state approval before accepting TENORM wastes

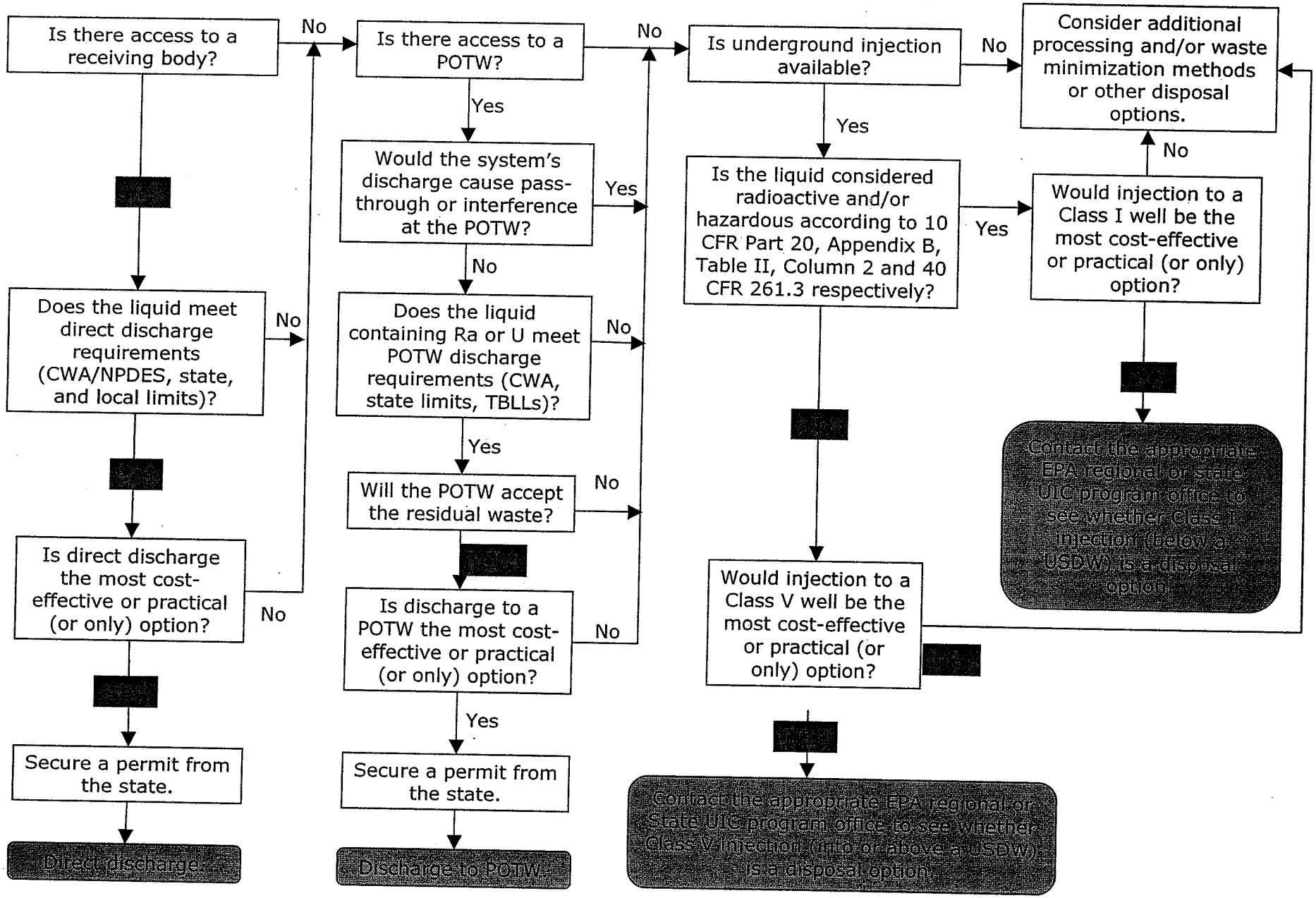
LLRW Landfills

- Licensed by NRC or by a state under agreement with NRC
- Barnwell - South Carolina
  - After June 30, 2008, will accept waste only from organizations in South Carolina, Connecticut, and New Jersey
- Richland - Washington
  - Accepts certain types of TENORM (although not hazardous or mixed) wastes from all states
- Envirocare - Utah
  - Has dedicated TENORM disposal and is the only LLRW landfill authorized to accept certain kinds of mixed waste

Solids Residual Disposal



Liquid Residuals Disposal



APPENDIX F

BACTERIOLOGICAL SAMPLE SITING PLAN

Bacteriological Sample Siting Plan

System Information

Name of Facility:	Campo Hills
Street Address:	1247 Sheridan Rd. Campo, CA 91906
Mailing Address:	5555 Overland Ave. Bldg. 2, Rm 260 MS-0384 San Diego, CA 92123
Service Connections:	222, Population Served: 555
Sampling Frequency:	1 sample per month

All Water Samples will be collected by Ron Basil. Steve Matthews will be responsible for reporting results to DHS:

- Monthly Report will be submitted by the 10th of the following month.
- Any positive sample results will be reported to DHS by telephone within 24 hours of being notified of the result by the laboratory.

Samples will be analyzed by one of the following certified laboratories:
San Elijo JPA Laboratory
2695 Manchester Ave.
Cardiff, CA. 92007
(760) 753-0352

EnviroMatrix Analytical Inc.
4340 Viewridge Ave., Suite A
San Diego CA 92123
(858) 560-7717
Fax (858) 560-7763
Samples will be collected for hose bibs at homes.

Map of System showing sample points is attached.

Routine Samples will be rotated between two sample points. Four repeat samples will be collected within 24 hours following a positive result. Repeat samples will be collected within five service connections upstream and downstream of the routine sample point as indicated below.

Routine Sample Point No. 1: Lot 47
(Samples collected January, March, May, July, September, November)
Repeat Sample Points: Lot 47, Lot 46, Lot 48 and Lot 49

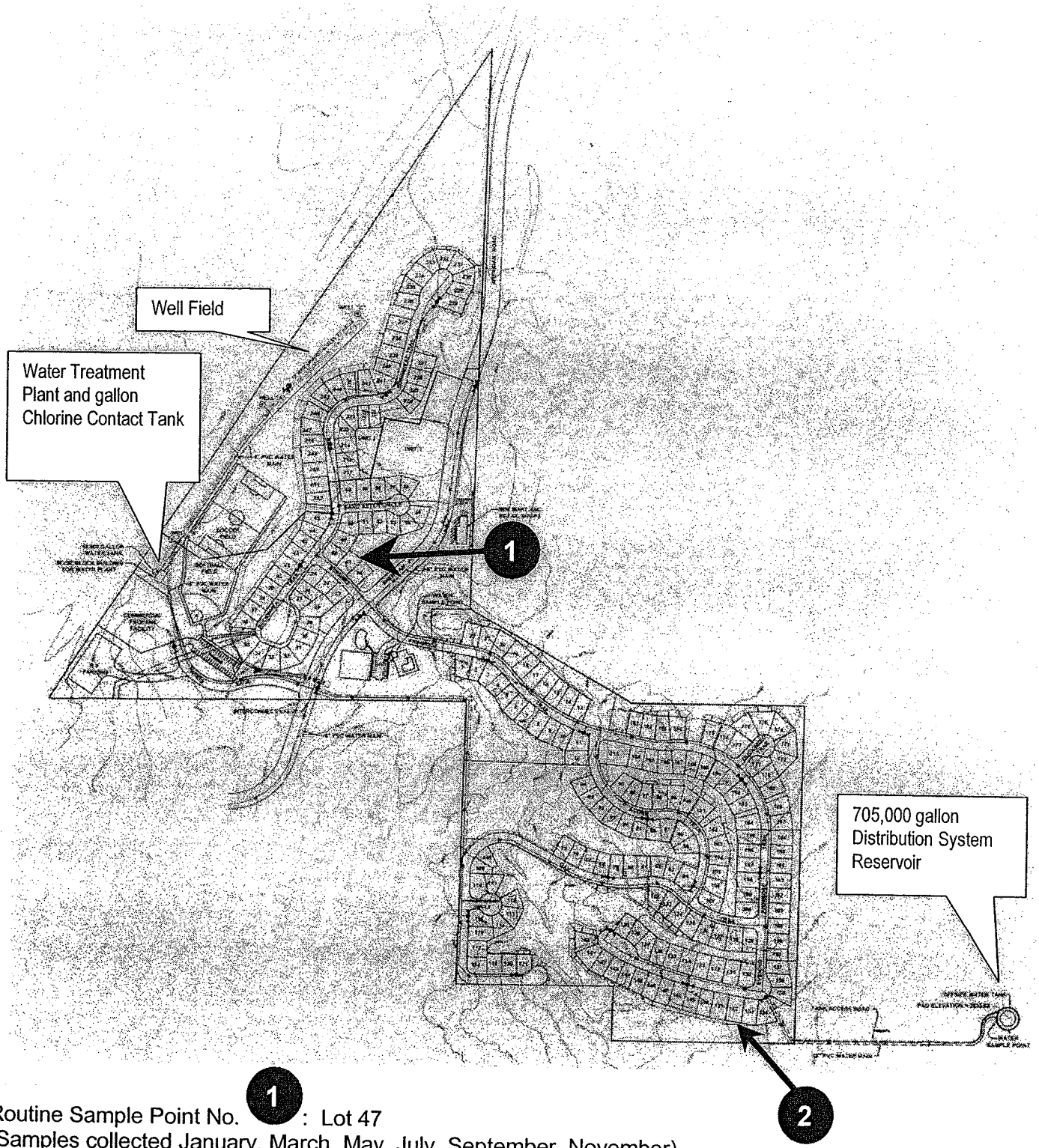
Routine Sample Point No. 2: Lot 152
(Samples collected February, April, June, August, October, December)
Repeat Sample Points: Lot 150, Lot 151, Lot 152 and Lot 155

Five Samples will be collected during the month following any positive result. Samples will collected from Routine Sample Point No. 1 (Weeks 1 and 3) and Routine Sample Point No. 2 (Weeks 2, 3, 4)

Sampling Plan Approved by:

Signature and Title:

08/30/04 SEP 07 2004



Routine Sample Point No. 1 : Lot 47
(Samples collected January, March, May, July, September, November)
Repeat Sample Points: Lot 47, Lot 46, Lot 48 and Lot 49

Routine Sample Point No. 2 : Lot 152
(Samples collected February, April, June, August, October, December)
Repeat Sample Points: Lot 150, Lot 151, Lot 152 and Lot 155

007

SEP 07 2004

Campo Hills

Bacteriological Sample Siting Plan

August 2004 Water Syst. No.: 3710047

APPENDIX G

CAMPO HILLS WATER TREATMENT PLANT

STARTUP AND TEST PERIOD PROTOCOL ENGINEERING SUBMITTAL

Campo Hills Water Treatment Plant

PV-150 Startup and Test Period Protocol
Engineering Submittal

August 5, 2004

Richard Pata Engineering
272 Cedar Avenue
El Centro, California 92243
760-352-0386 FAX 760-352-7856
richardpata@integrity.com

Campo Hills Water Treatment Plant

The Campo Hills water treatment plant is located at 1247 Sheridan Road just outside of Campo, California off of State Route 94. It is owned and operated by the San Diego County Public Works Department. This plant provides potable water for the 222 homes in the Campo Hills Housing Division.

The water treatment plant for Campo Hills has been designed to exceed the estimated maximum demand of 300,000-gpd required for the 222 homes within the development. The treatment system includes two PV-150 packaged treatment plants and one Basin Water negative ion exchange system for uranium removal. The entire water treatment system is designed to produce potable water at a rate of 300-gpm.

Overview of Treatment Plant Operations

Well # 2

Each PV-150 water treatment plant and the uranium removal system are designed to continuously treat water for the Campo Hills Housing Division utilizing source water from two wells adjacent to the project site. A third well is used exclusively for irrigation water. Well number one supplies plant number one and well number ~~two~~ three, Well #3 supplies plant number two exclusively. By existing valving the supply can switched from one plant to another.

Treated water is ultimately stored in a 30-foot tall 704,000 tank with its top at 2,832.82 feet in elevation. Level sensors in this tank call for water when the level has fallen to a level of 2,830.82 and two booster pumps in the water plant building, elevation 2,615.00, begin to lift water up the hill at a rate of 150-gallons per minute. The signal to start the pumps is relayed by telemetry from the tank to the pump building. These booster pumps pull water from a 40,000-gallon clear well at the water plant site and pressurize the main lines for the system.

When the level in the 40,000-gallon clearwell has fallen 18 inches the treatment plants receive a signal to start the respective well pumps and water treatment plant thus using the 40,000-gallon tank as a buffer between the plant production and the pumping capacity of the booster pumps.

Raw water turbidity is less than 1 NTU. Finished water turbidity is monitored continually monitored at each plant and recorded on a dual pen chart recorder. Free chlorine residual is continually monitored at the discharge of the booster pumps as the water enters the system.

Prior to final acceptance of the plant water samples were taken at three primary locations:

At the middle well head PW-1 while pumping at a rate of 150 gpm	(raw water)
After the PV-150 water treatment plant operating at a rate of 150 gpm	(filtered water)
After the Basin Water ION Exchange unit in route to clear well	(finished water)

The following initial one time samples were taken to assure performance of the equipment and compliance with Title 22 Standards:

Ph,	Fluoride
Electrical Conductivity	MBAS
TDS	Nitrate
MTBE	Sodium
Odor	Calcium
Vanadium	Hardness
Boron	Manganese
Iron	Gross Alpha
Corrosivity	Gross Beta
Total Coliform	Radium 226
Fecal Coliform	Radium 228
Chloride,	Uranium
Sulfate	Potassium.

Provided the above mentioned testing yields satisfactory results and results have been validated by the County the plant will be operated on an on a continuous basis for a 14-day test period with the following testing and protocols. Failure of any major component will cause the 14-day test period to start over. Failure of water quality testing means failure to meet any drinking water standard.

Bacteriological testing monthly rotating between two routine sample points with two alternate points identified.

Routine sample 1:	Lot 47	)
Routine sample 2	Lot 152	
Alternate sample 3	@ sample tap on 40,000-gallon tank	(up stream)
Alternate sample 4	@ sample tap on 704,000-gallon tank	(down stream)

Uranium testing	monthly by Basin Water.
Raw water turbidity	grab sample daily
Finished water turbidity	continuously monitored and recorded
Chlorine residual @ entrance to system	continuously monitored and recorded
Chlorine residual at filter effluent	Daily
pH and temperature	Daily from plant influent, filter effluent and ion exchange effluent
Disinfection by products (THM,HAA5)	Lot 152 and 40,000 gallon tank

Monitoring of plant operation, and individual process, electrical, mechanical and control functions will be completed at a minimum of once per day by qualified representative of Campo Hill and documented. Rotating equipment will be checked for proper operation, pumps and blowers will be checked for proper amperage draw. Monitoring equipment will be calibrated and verified for proper operation.

For the first 8 hours of operation the plant grade III operator should be on site and immediately available should any malfunction occur. For the next 32 hours the operator should be quickly available to respond to the facility within a reasonable time frame as

necessary Campo Hills will provide qualified personnel to monitor the dailiy operation of the facility throughout this 14-day period.

Following the initial start up period of 40 hours of continuous operation county staff will monitor the operation of the facility periodically throughout the normal workday. County staff will not make any operational or control mode adjustments and will assume no responsibility for the operation of the facility other than notification to the responsible parties of conditions other than normal anticipated operation.

To start the plant trigger the level switch in the 40,000-gallon tank and the following should occur;

- The Plant begins filter to waste cycle, cycles will be timed and duration of individual cycles monitored
- The well pumps start at a programmed rate and deliver to the individual plants. Well pumps will be checked for proper operation, flow and physical characteristics of pump operation will be monitored
- Chemical feed pumps begin dosing coagulant at prescribed rate. Dosing cycles will be monitored, pump operation, chemical feed , feed lines, connections will be checked
- Electric valve sends plant effluent to waste. Proper operation and cycle time sequence
- Check filtrate pump for flow, leaks, and proper operation and document
- Check coagulant feed pump for flow, leaks and proper operation. . Proper operation and cycle time sequence
- Check chlorine feed pump for flow, leaks and proper operation
- Check clarifier and filter body as well as piping for leaks.
- After the prescribed time the plant timer shifts to the filter cycle where plant effluent is sent to the ION exchange system and then to storage. Assure timed sequence of cycles.
- Observe Free Chlorine residual and Turbidity to insure they are within tolerance daily

By manipulation of the timer trigger a clarifier rinse and observe and document the following:

- Check operation of the electrically operated clarifier waste valve and associated timer to assure water level in clarifier is lowered prior to rinsing bed.
- Check proper operation of the Regenerative air blower.
- Check flow increase in the output from the respective well to double the flow through the clarifier.
- Verify that the timer allows system to run adequate time to thoroughly rinse the clarifier bed.
- Verify system runs filter to waste after clarifier rinse.
- Verify differential pressure switch can trigger clarifier rinse in addition to the timer.

By manipulation of the timer trigger a filter backwash and observe and document the

following:

- Check operation of the electrically operated backwash valve to supply backwash water.
- Verify timer allows system to run adequate time to thoroughly clean the filter bed.
- Verify system runs filter to waste after filter backwash

Check chlorine analyzer for proper residual in the plant.
Check turbidimeter for proper turbidity in the plant effluent.
Check two pen chart recorder for proper scaling and operation.
Verify hour meter is recording time of operation.
Check for proper flow through plant and verify flow through chemical feed devices.
Verify plant shut down, alarms and dialer on the following signals.

- When level switch in 40,000-gallon indicates tank is full.
- With low or no flow from either raw water well.
- With low or no coagulant pressure.
- With low or no pressure in chlorine disinfectant.
- With low chlorine residual.
- With high turbidity.

Clean all exterior surfaces of plant.
Maintain all logs, records and reports for the plant.

For additional detail or specific operation of the individual equipment please see Operations Manual

Respectfully submitted,
Richard Pata Engineering

Richard P. Pata, PE

APPENDIX H

CHEMICAL FEED PUMP CALIBRATION

MONITORING EQUIPMENTS CALIBRATION

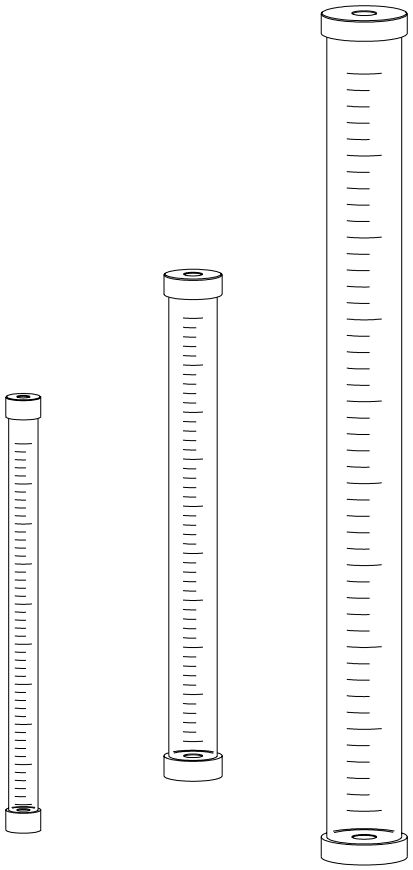
CHEMICAL FEED PUMP CALIBRATION

Information Sheet
Calibration Cylinders

LMI calibration cylinders provide verification of your metering pump output.

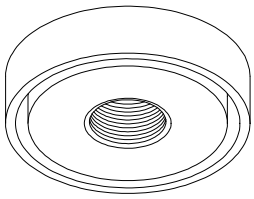
Designed of chemically resistant materials, these calibration cylinders can be used in a variety of applications.

Graduations are in both milliliters (ml) and gallons per hour (GPH).



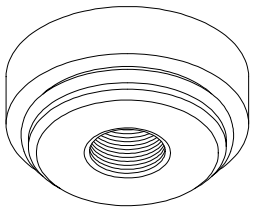
Features:

- High Reliability / Low Cost
- Two Models: EZ-Clean and Vented
- Three Sizes: 200 ml, 1000 ml, and 4000 ml
- High Contrast Graduation Markings
- Clear, Easy-View Tube
- Sealed with Overflow Connection
- Direct GPH Readout



Vented

Model No.	Size/Volume
35643	200 ml
35644	1000 ml
35860	4000 ml



EZ-Clean

Model No.	Size/Volume
35645	200 ml
35710	1000 ml
35861	4000 ml

Vented

Top is glued to cylinder and contains a vent or overflow connection (NPT). Use in applications where there is a positive suction head or a permanent installation is desired.

EZ-Clean

Top is sealed with an O-Ring and has a vent connection, but is removable for easy cleaning. Use in applications where frequent cleaning is required, such as polymer, alum or chlorine.

LMI
LIQUID METRONICS DIVISION
MILTON ROY
A unit of Sundstrand Corporation

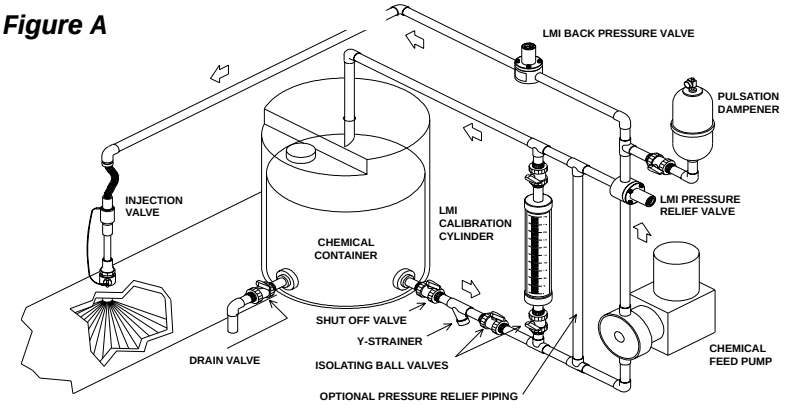
8 Post Office Square
Acton, MA 01720 USA
TEL: (978) 263-9800
FAX: (978) 264-9172
http://www.lmipumps.com

Replaces same of Rev. A 1/97
1798.A 12/97

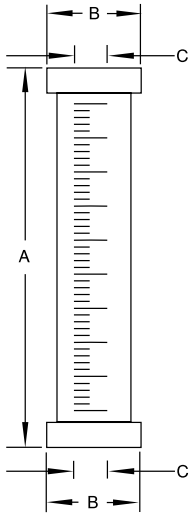
Instruction Sheet
Calibration Cylinders

Typical Installation

Figure A



Measurements			
Size	**200 ml**	**1000 ml**	**4000 ml**
Scale	**2 ml**	**5 ml**	**10 ml**
A (in)	19.0	22.0	37.0
B (in)	1.5	2.5	3.7
C (in)	1/2 FNPT	3/4 FNPT	1 FNPT



LMI calibration cylinders are installed in the suction line. Two isolating valves, (not supplied) must be installed in the suction line (see Figure A). The top of the cylinder is vented back to the storage tank or to drain.

Fill the cylinder to the top mark then close the valve from the chemical tank. Switch on the feed pump and draw down the solution in the cylinder for 30 seconds. Switch the pump off. The reading on one side is the feed pump output in GPH.

Alternatively, observe the volume withdrawn on the ml scale. To convert to l/h or GPH use this formula:

l/h = (volume ÷ draw time) x 3.6 GPH = (volume ÷ draw time) x 0.952

Note: ***Max. cylinder pressure is 15 psi (1 Bar).***

Chemical Resistance Guide

RECOMMENDED					NOT RECOMMENDED
Acetic Acid 10-20%	Barium Sulphate	Copper Sulphate	Linoleic Acid	Potassium Hydroxide	Acetic Acid
Acetylene	Barium Sulfide	Cupric Fluoride	Linseed Oil	Potassium Nitrate	Acetone
Adipic Acid	Beer	Detergents	Lithium Bromide	Potsm Permanganate	Ammonia (liquid)
Alum	Benzoic Acid	Dextrose	Malic Acid	Plating Solutions	Ammonium Fluoride
Aluminium Alum	Black Liquors	Distilled Water	Mercuric Chloride	Sea Water	Amyl Acetate
Aluminium Chloride	Bleach (12% Cl)	Ethylene Glycol	Mercuric Cyanide	Silicic Acid	Benzene
Aluminium Fluoride	Borax™	Fatty Acids	Mercury	Silver Cyanide	Bromine, Liquid
Aluminium Hydroxide	Boric Acid	Ferric Chloride	Methyl Alcohol	Silver Nitrate	Bromine, water
Aluminium Oxychloride	Bromic Acid	Ferric Hydroxide	Methyl Sulfuric Acid	Sodium Acetate	Butyl Acetate
Aluminium Nitrate	Cadmium Cyanide	Ferric Nitrate	Milk	Sodium Alum	Carbon Bisulfide
Aluminium Sulfate	Calcium Bisulfide	Ferric Sulfate	Muratic Acid	Sodium Bicarbonate	Carbon Tetrachloride
Ammonia (dry-gas)	Calcium Bisulfite	Ferrous Chloride	Nitric Acid 10% - 60%	Sodium Bisulfate	Chlorine Gas
Ammonium Acetate	Calcium Carbonate	Ferrous Sulfate	Oleic Acid	Sodium Carbonate	Chlorine (wet)
Ammonium Alum	Calcium Chloride	Fluorosilicic Acid 25%	Ozone	Sodium Cyanide	Chromic Acid 10%
Ammonium Bifluoride	Calcium Hydroxide	Gallic Acid	Palmitric Acid 10%	Sodium Hydroxide	Chromic Acid 50%
Ammonium Carbonate	Calcium Hypochlorite	Gasoline	Perchloric Acid 10%	Sodium Hypochlorite	Ethers
Ammonium Chloride	Calcium Nitrate	Glycerine	Phosphoric Acid 10%	Stannic Chloride	Fluorine Gas
Ammonium Hydroxide	Carbon Dioxide	Glycol	Phosphoric Acid 25%	Sulfuric Acid 3%	Hydrofluoric Acid 50%
Ammn. Metaphosphate	Carbonic Acid	Glycolic Acid	Phosphoric Acid 75%	Sulfuric Acid 10%	Iodine
Ammonium Nitrate	Caustic Potash	Hydrobromic Acid 20%	Phosphoric Acid 85%	Sulfuric Acid 33%	Nitric Acid Anhydrous
Ammonium Persulfate	Caustic Soda	Hydrochloric Acid 35%	Potassium Alum	Sulfuric Acid 50%	Nitric Acid 68%
Ammonium Phosphate	Chlorine Water	Hydrocynac Acid	Potassium Bicarbonate	Sulfuric Acid 70%	Perchloric Acid 15%
Ammonium Sulfate	Chrome Alum	Hydrogen Peroxide 90%	Potassium Borate	Trisodium Phosphate	Perchloric Acid 70%
Ammonium Sulfide	Citric Acid	Hydrogen Sulfite	Potassium Bromate	Water, Deionized	Sulfur Dioxide (wet)
Ammonium Thiocyanate	Copper Carbonate	Kraft Liquors	Potassium Carbonate	Water, Distilled	Sulfuric Acid 80-94%
Arsenic Acid	Copper Chloride	Latic Acid 25%	Potassium Chlorate	Water, Salt	Titanium Tetrachloride
Barium Carbonate	Copper Cyanide	Lead Acetate	Potassium Chloride	Zinc Chloride	Tributyl Phosphate
Barium Chloride	Copper Fluoride	Lead Chloride	Potassium Cyanide	Zinc Sulfate	Turpentine
Barium Hydroxide	Copper Nitrate	Lead Sulfate	Potassium Fluoride		

5.0 Instrument Calibration

The instrument was calibrated and tested prior to leaving the factory. Therefore, it is possible to use the instrument directly out of the box. Under normal conditions, re-calibration is recommended at least once every three months[1].

Relay contacts are held at the last valid condition and will not change state while the instrument is in the calibration and/or in the configuration mode. While in the calibration mode, the instrument has a time-out feature that automatically returns the system operation to the **AUTO** mode after a fifteen (15) minute period of inactivity.

5.1 Calibration Standards

If the Micro TOL will be used over the entire range of .02 to 1000 NTU a complete calibration as described below will be required. If instrument accuracy is only required below 10 NTU, such as potable water, a calibration may be performed using only a 10 NTU and a 0.02 NTU standard. To calibrate starting at the 10 NTU, press the ▼ button to bypass the 1000 NTU and proceed to Section 5.2 *Calibration Procedures*, step 5.

We recommend that the following materials be used during calibration to achieve the full-scale accuracy stated in this manual:

1. 0.02 NTU PRIMELIME Calibration Standard available from HF scientific inc.
2. 10.0 NTU PRIMELIME Calibration Standard available from HF scientific, inc.
3. 1000 NTU PRIMELIME Calibration Standard available from HF scientific, inc.

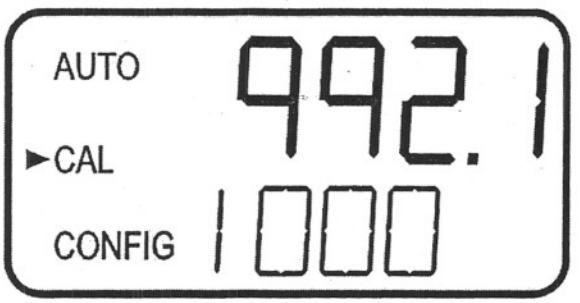
It is well known that diluted Formazin is unstable. If Formazin is used to calibrate the instrument, ensure that a fresh stock suspension of Formazin is used to achieve the accuracy quoted for the instrument. A Formazin Stock Solution Kit is available from HF scientific, inc. (Catalog No. 50040). The HF scientific, inc. PRIMELIME, primary calibration standards (refer to section 11.0 *Accessories and Replacement Parts List*) are more stable than Formazin and have a minimum shelf life of 12 months. Prior to recalibration, review the expiration dates, to ensure that the standards have not expired.

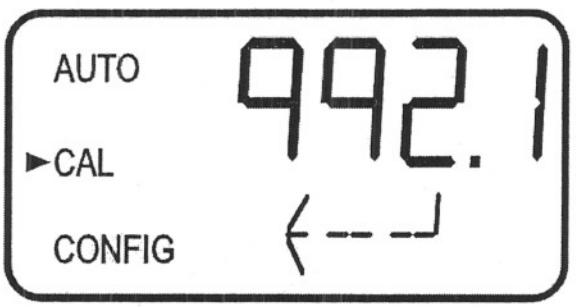
Note: The range of Models 20055 & 20056 is .02 to 100 NTU. For calibrating these models replace the 1000 NTU standard with a 100 NTU standard.

[1] The EPA recommends that on-line turbidimeters be calibrated with a primary standard at least once every three months if they are to be used for EPA reporting.

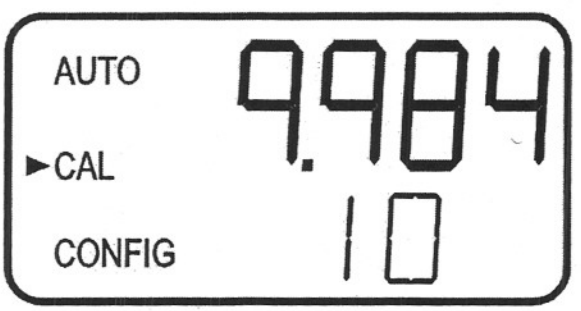
5.2 Calibration Procedures

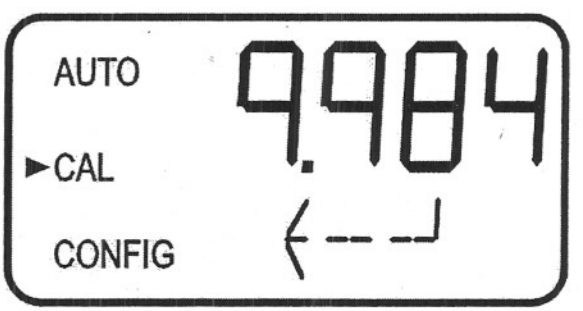
1. Select the calibration function of the instrument by pressing the **MODE/EXIT** button once. The arrow beside **CAL** will be illuminated on the display. The lower display shows alternating **1000 (**the value of the standard that is requested) and ↵. The upper display shows the real-time reading to allow the standard to be indexed. Refer to section 6.1 for information on indexing cuvettes.



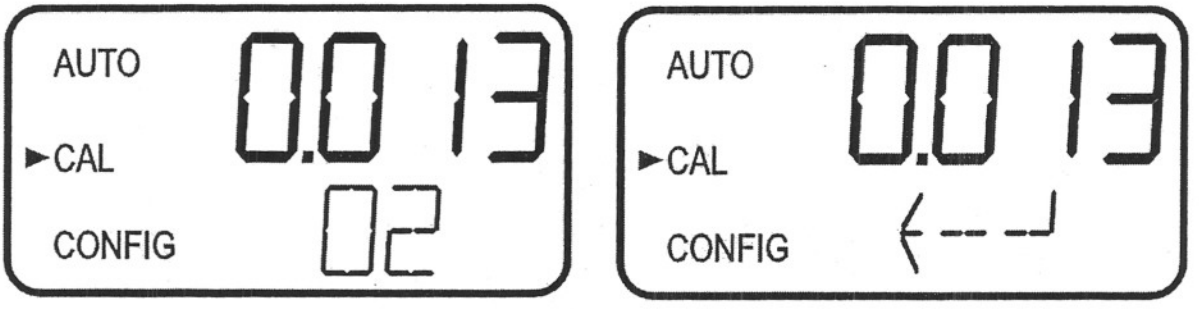


2. Remove the flow through unit.
3. Insert the requested 1000 NTU standard. Index the standard to the lowest value on the upper display.
4. Press the ↵ button to accept the calibration.
5. The lower display will count down the progress of the calibration step.
6. The lower display will now change to show alternating **10** and ↵, requesting the 10.0 NTU standard.





7. If the alternating **10** and ↵ is not displayed, push the ▲ or ▼ until this display is shown.
8. Insert the requested 10.0 NTU standard. Index the standard to the lowest value on the upper display.
9. Press the ↵ button to accept the calibration.
10. The lower display will count down the progress of the calibration step.
11. The lower display will now change to show **02** and ↵, requesting the 0.02 NTU standard.



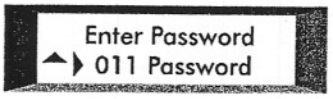
12. Insert the requested 0.02 NTU standard. Index the standard to the lowest value on the upper display.
13. Press the ↵ button to accept the calibration.
14. The lower display will count down the progress of the calibration step.
15. The instrument will return to **AUTO** mode at the end the calibration.

Note: During calibration, the fan inside the instrument is turned off to extend the life of the desiccant. The fan will be turned on during calibration countdowns and after returning to the AUTO mode or after five minutes, which ever comes first. It is recommended that the measurement chamber be kept covered during the calibration period and that the flow through cuvette be replaced immediately after the calibration to prevent premature saturation of the desiccant.

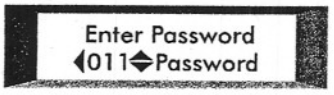
5.3 Calibration Error

If the screen shown below, is displayed after calibration, the internal diagnostics have determined that the calibration standards were either bad or that they were inserted in the wrong order. Either check the standards and recalibrate or restore the factory calibration see *6.2 Restoring Factory Settings*. The instrument cannot be used without performing one of these operations.

To recalibrate press the MODE key and start the calibration sequence again. To restore the factory calibration, push and hold the ▲ button. Now push and release the ↵ then release the ▲ button.



For changing the displayed value press key 



Use keys  to adjust the display to the correct password.

For each touch of key  the numerical value changes by +1. Longer pressing of the key increases the numerical value continuously.

For each touch of key  the numerical value changes by -1. Longer pressing of the key decreases the numerical value continuously.

The ranges of numerical values that can be entered are within fixed limits.

Press key  to enter and store the value.

The instrument can be secured against unauthorized or unintentional changing of settings. There are two different passwords.

- Password 086 allows access to all functions.
- Password 011 allows access to functions calibration, temperature compensation, and Set Points

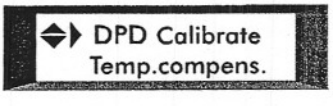
All other numbers will lock the controller, and the instrument is secured against unintentional changing of the data.

If a "restricted" part of the menu is addressed, the user will be asked to enter the appropriate password (unless this has been entered already).

6.2 Calibration (DPD)

NOTE *The calibration is possible with password 11 or 86.*
NOTE *Be sure to adjust the correct temperature (for manual compensation).*
WARNING *To avoid the dosing of chemicals set the controller function to „MAN"*

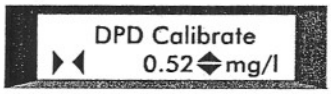
6.2.1 Calibration procedure



Set controller to MAN
Address and select menu CALIBRATION

with key  select menu DPD calibrate. To change the displayed calibration value press key

. There are two flashing arrows, indicating the controller is ready to accept new calibration data.



With keys enter the analyzed (DPD test) value.

For each touch of key the numerical value changes by +1. Longer pressing of the key increases the numerical value continuously.

For each touch of key the numerical value changes by -1. Longer pressing of the key decreases the numerical value continuously.
The ranges of numerical values that can be entered are within fixed limits.

1. Press the key hold it pressed down and additionally press key. to store the new value and complete the calibration.

NOTE *After the calibration do not forget to reset the controller to "AUTO".*
NOTE Reset the temperature to the previous value (for manual compensation).

6.3 Calibration of the oxygen- measurement

NOTE *The calibration is possible with passwords 11 or 86.*
NOTE *Be sure to adjust the correct temperature (for manual compensation).*
WARNING *To avoid the dosing of chemicals set the controller function to „MAN"*

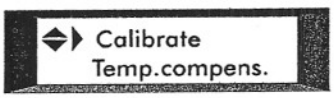
Calibration is carried out with the oxygen content of the ambient air.
This means to take the sensor out of the test water and just hold it into the air.
The temperature dependency of the oxygen content is automatically taken into account during calibration.

NOTE The saturation concentration of ambient air and actual temperature dependency are calculated according to DIN 38408, part 22

6.3.1 Calibration procedure

Set controller to MAN
Rinse the sensor and dry the membrane with a soft tissue.
Hold the sensor into the air for approximately 10 to 15 minutes.
The integrated temperature sensor measures the temperature of the ambient air, and the oxygen meter calculates and displays the oxygen content according to the integrated temperature table.

Address and select menu CALIBRATE



With key select menu calibrate. To change the displayed calibration value press key There are two flashing arrows, indicating the controller is ready to accept new calibration data.

APPENDIX I

COUNTY OF SAN DIEGO

EMERGENCY/DISASTER/DISINFECTION RESPONSE PLAN

County of San Diego
Emergency/Disaster/Disinfection Response Plan

Campo Hills Water Treatment and Distribution System

To continue minimum service levels and mitigate the public health risks from drinking water contamination that may occur during a disaster or other emergency events and in order to provide reliable water service and minimize public health risks from unsafe drinking water during those events, the County of San Diego Campo Hills water system proposes the following plan that defines how it will respond to emergencies and/or disasters that are likely to affect its operation.

Disasters/emergencies that are likely to occur in the water system's service area that are addressed are: earthquake, major fire emergencies, water outages due to loss of power, localized flooding, water contamination, and acts of sabotage.

1) **DESIGNATED RESPONSIBLE PERSONNEL:** For designated responsible personnel and chain of command and identified responsibilities, see the attached "Emergency and Disaster Personnel and Responsibilities".
2) **INVENTORY OF RESOURCES:** An inventory of system resources that are used for normal operations and available for emergencies; includes maps and schematic diagrams of the water system, lists of emergency equipment, equipment suppliers, and emergency contract agreements that are kept at the water system office.
3) **EMERGENCY OPERATIONS CENTER:** The water system office has been designated as the communication network emergency operations center. Emergency contact information for equipment suppliers is attached. The telephone and FAX will be the primary mode of communication in an emergency. In addition, the local fire department and law enforcement have a radio and we have made arrangements to use it to contact police, fire and other emergency response personnel should telephone communication be lost.

Agency	Address, City	Phone #	FAX #
Water System Operation Center	11937 Campo Rd. Spring Valley, 91975	(619) 660-2008	(619)670-1576
Fire Department	437 Jeb Stuart Road Campo, CA. 91906	(619) 478-5310	
Law Enforcement	Sheriff Sub Station 378 Sheridan Road Campo, CA. 91906	(619) 478-5378	

4) **OTHER AGENCY COORDINATION:** Coordination procedures with governmental agencies for health and safety protection; technical, legal, and financial assistance, and public notification procedures are continually being developed and updated through regulation and experience and will be added as necessary to this plan.

5) **RESPONSE PROCEDURES:** Personnel will, as quickly as possible, determine the status of other employees, assess damage to water system facilities, provide logistics for emergency repairs, monitor progress of repairs and restoration efforts, communicate with health officials and water users according to the "Emergency Notification Plan" on file with the regulatory agency (i.e., Department of Public Health (DPH) or Local Primacy Agency (LPA)), and document damage and repairs.

6) **RESUME NORMAL OPERATIONS:** The steps that will be taken to resume normal operations and to prepare and submit reports to appropriate agencies will include identifying the nature of the emergency (e.g., earthquake-causing water outage/leaks, fire or power outage causing water shortage/outage, sabotage resulting in facility destruction or water contamination).

a. Leaks or service interruption (Result of earthquake, etc.)

i. Isolate leak. Turn power or flow off, if necessary, to control leak.
ii. Repair or isolate break to allow service to the maximum system population possible. Disinfect as per attached AWWA Standards; increase system disinfectant residual as precaution, until normal service is resumed.
iii. Do bacteriological sampling until 3 good consecutive samples are confirmed.
iv. Reestablish normal service.

b. Low pressure (Result of earthquake, fire, storm)

i. Increase production, if possible, to provide maximum system output.
ii. Increase disinfectant residual as precaution to potential contamination.

c. Power outage

i. Place emergency generator on line to provide minimum water pressure to system.
ii. Increase disinfectant residual as precaution to potential contamination.

d. Contamination

i. Identify location and source of contamination.

ii. If contamination is from system source, isolate or treat source.
iii. If contamination is an act of sabotage, take appropriate action based on nature of contamination. Immediately contact local law enforcement and your regulatory agency (DHS or LPA). Actions should be taken in consultation with the regulatory agency and could include shutting off water until all contaminants are identified.

e. Physical destruction of facility (sabotage)

i. Immediately contact local law enforcement and regulatory agency for consultation.

7) <u>EMERGENCY DISINFECTION PLAN</u>: In case of positive bacteriological samples, existing chlorine dosing will be adjusted to meet minimum 1 ppm during emergency.

All significant water outages (widespread and lasting more than eight hours) or disinfection failure will be reported to the Department of Public Health (DPH) District Office, or Local Primacy Agency (LPA) by telephone or equally rapid means. All emergencies will be documented along with action taken, and kept in the files of the water system office. Acts of sabotage will be reported to the local law enforcement agency.

Emergency and Disaster Personnel and Responsibilities

Name /Title	Telephone No. (Work)/Cell	Role
Daniel Brogadir Department of Public Works (DPW) Program Manager	(858) 694-2714 Cell (858) 822-8856	Responsible for the coordination of all activities during the event of an emergency
Milica Kaludjerski, PE Department of Public Works (DPW) Unit Manager	(858) 694-2718 Cell (858) 248-5237	Responsible for the coordination of all activities during the event of an emergency
Jim Lesire DPW Facility Supervisor	(619) 660-2008 Cell (858) 204-1569	Responsible for the activities and actions of those individuals responding in the event of an emergency.
Rocky Vandegriff Operator III	(760)-353-0328 (760)427-4235	Oversight and Direction of operations staff.
Ron Basil Operator I	(858) 204-1648	First emergency responder distribution
Romulo Tanala Electrician	(858) 204-1590	Electrical and control emergencies.

Additional Mutual Assistance or Emergency Resources

The County of San Diego has entered into and adopted a Board of Supervisors approved MUTUAL AID AGREEMENT with the majority of Cities and Municipalities throughout the County of San Diego to assist with equipment and/or emergency personell as required in emergency situations.

Agency/Department	Telephone No. (Day) Telephone No. (After Hours)
Another Water Agency	
Fire Department	(619) 478-5310
Local Law Enforcement	(619) 478-5378
County Office of Emergency Services	(858) 565-5262 (858) 565-5255
FBI Office (terrorism or sabotage) (Also notify local law enforcement.)	(858) 565-1255
DPH District Office	(619) 525-4159

Local Environmental Health Agency	(858) 619-3113 (858) 694-2242

Water system contact information:

Name:	*Milica Kaludjerski*
Address:	*5555 Overland Ave. Bldg. II, Room 260*
City, State, Zip code:	*San Diego, CA. 92123*
Phone:	*(858) 694-2718*
FAX:	*(858) 694-2791*

Emergency Contact Numbers and Operational Practices

A. List of equipment on hand for emergency repairs

1. DPW response vehicles are outfitting with the necessary inventory and tools required to make minor emergency repairs to the system and are stationed at the Spring Valley operations center.

B. List of sources of needed equipment, not on hand

See TECHNIAL APPENDAGE, APPENDAGE Q – DPW Emergency Response Plan – This plan includes a detailed list and location of emergency equipment.

C. List of distributors or suppliers of replacement parts for the system

See TECHNICAL APPEDAGE, APPENDAGE G – surface water treatment Operations plan – Section VII Equipment Maintenance Program.

Ferguson Pipe and Supply – (619) 515-0300

Westburn Pipe – (619) 401-8750

Barrett Pumps – (619) 557-6302

Precision Pumps – (760) 781-5554

D. List of emergency contact numbers:

	Name	Phone (Day)	Phone (After-hours)
DPH District Office	Sean Sterchi	(619) 525-4922	
Local Environmental Health Agency (LPA)	Mark McPherson	(858) 495-5572	(619) 843-4094
Electrician	Romulo Tanala	(858) 660-2008	(858) 204-1590
Laboratory	EnviroMatrix	(858) 560-7717	
Electric & Pump (repair service)	Sloan Electric	(619) 239-5174	
Chemical Disinfectant Supplier	Agricultural Installations	(760) 489-2689	
Other Water Agency (equipment support)	Mutual Aid Agreement Various Agencies		
Fire Department		(619) 478-5310	
Law Enforcement		(619) 478-5378	
County Office of Emergency Services	Station M	(858) 565-5262	(858) 565-5255

APPENDIX J

CHLORINE CONTACT TIME (CT) CHART

VOLUME CALCULATIONS FOR UNIT PROCESS

CT Calculation for Storage Capacity

TABLE E-6 At 25° C (1) = 77° F

CT VALUES FOR INACTIVATION OF GIARDIA CYSTS BY FREE CHLORINE

Chlorine Concentration (mg./L)	pH = 7.0 Log Inactivation						pH = 7.5 Log Inactivation						
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	
<=0.4	6	12	18	23	29	35	7	14	21	28	35	42	<=0.4
0.6	6	12	18	24	30	36	7	14	22	29	36	43	0.6
0.8	6	12	19	25	31	37	7	15	22	29	37	44	0.8
1.0	6	12	19	25	31	37	8	15	23	30	38	45	1.0
1.2	6	13	19	25	32	38	8	15	23	31	38	46	1.2
1.4	7	13	20	26	33	39	8	16	24	31	39	47	1.4
1.6	7	13	20	27	33	40	8	16	24	32	40	48	1.6
1.8	7	14	21	27	34	41	8	16	25	33	41	49	1.8
2.0	7	14	21	27	34	41	8	17	25	33	42	50	2.0
2.2	7	14	21	28	35	42	9	17	26	34	43	51	2.2
2.4	7	14	22	29	36	43	9	17	26	35	43	52	2.4
2.6	7	15	22	29	37	44	9	18	27	35	44	53	2.6
2.8	8	15	23	30	38	45	9	18	27	36	45	54	2.8
3.0	8	15	23	31	38	46	9	18	28	37	46	55	3.0

Chlorine Concentration (mg./L)	pH = 8.0 Log Inactivation						pH = 8.5 Log Inactivation						
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	
<=0.4	8	17	25	33	42	50	10	20	30	39	49	59	<=0.4
0.6	9	17	26	34	43	51	10	20	31	41	51	61	0.6
0.8	9	18	27	35	44	53	11	21	32	42	53	63	0.8
1.0	9	18	27	36	45	54	11	22	33	43	54	65	1.0
1.2	9	18	28	37	46	55	11	22	34	45	56	67	1.2
1.4	10	19	29	38	48	57	12	23	35	46	58	69	1.4
1.6	10	19	29	39	48	58	12	23	36	47	58	70	1.6
1.8	10	20	30	40	50	60	12	24	37	48	60	72	1.8
2.0	10	20	31	41	51	61	12	25	38	49	62	74	2.0
2.2	10	21	31	41	52	62	13	25	39	50	63	75	2.2
2.4	11	21	32	42	53	63	13	26	40	51	64	77	2.4
2.6	11	22	33	43	54	65	13	26	39	52	65	78	2.6
2.8	11	22	33	44	55	66	13	27	40	53	67	80	2.8
3.0	11	22	34	45	56	67	14	27	41	54	68	81	3.0

Tank Storage capacity = V	56,000	gal.
Tank baffling constant = b	0.34	
Max distribution rate = r	300	gpm
pH	7.5	
Chlorine concentration = c	0.5	mg/L
Log Inactivation	1	
CT Value from chart	14	
CT=[(V/r)*b+V']*c	31.7	mg/L/min
Ratio = [(V / r)* c * b] / CT	2.27 > 1 ∴ OK	

on all temperature sheets

Select CT from chart for each temperature.

Read Ratio @ bottom of sheet

CT Calculation for Storage Capacity & Plugged Flow Piping

TABLE E-5 At 20° C (1) = 68° F

CT VALUES FOR INACTIVATION OF GIARDIA CYSTS BY FREE CHLORINE

Chlorine Concentration (mg./L)	pH = 7.0 Log Inactivation						pH = 7.5 Log Inactivation						
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	
<=0.4	9	17	26	35	43	52	10	21	31	41	52	62	<=0.4
0.6	9	18	27	36	45	54	11	21	32	43	53	64	0.6
0.8	9	18	28	37	46	55	11	22	33	44	55	66	0.8
1.0	9	19	28	37	47	56	11	22	34	45	56	67	1.0
1.2	10	19	29	38	48	57	12	23	35	46	58	69	1.2
1.4	10	19	29	39	48	58	12	23	35	47	58	70	1.4
1.6	10	20	30	39	49	59	12	24	36	48	60	72	1.6
1.8	10	20	31	41	51	61	12	25	37	49	62	74	1.8
2.0	10	21	31	41	52	62	13	25	38	50	63	75	2.0
2.2	11	21	32	42	53	63	13	26	39	51	64	77	2.2
2.4	11	22	33	43	54	65	13	26	39	52	65	78	2.4
2.6	11	22	33	44	55	66	13	27	40	53	67	80	2.6
2.8	11	22	34	45	56	67	14	27	41	54	68	81	2.8
3.0	11	23	34	45	57	68	14	28	42	55	69	83	3.0

Chlorine Concentration (mg./L)	pH = 8.0 Log Inactivation						pH = 8.5 Log Inactivation						
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	
<=0.4	12	25	37	49	62	74	15	30	45	59	74	89	<=0.4
0.6	13	26	39	51	64	77	15	31	46	61	77	92	0.6
0.8	13	26	40	53	66	79	16	32	48	63	79	95	0.8
1.0	14	27	41	54	68	81	16	33	49	65	82	98	1.0
1.2	14	28	42	55	69	83	17	33	50	67	83	100	1.2
1.4	14	28	43	57	71	85	17	34	52	69	86	103	1.4
1.6	15	29	44	58	73	87	18	35	53	70	88	105	1.6
1.8	15	30	45	59	74	89	18	36	54	72	90	108	1.8
2.0	15	30	46	61	76	91	18	37	55	73	92	110	2.0
2.2	16	31	47	62	78	93	19	38	57	75	94	113	2.2
2.4	16	32	48	63	79	95	19	38	58	77	96	115	2.4
2.6	16	32	49	65	81	97	20	39	59	78	98	117	2.6
2.8	17	33	50	66	83	99	20	40	60	79	99	119	2.8
3.0	17	34	51	67	84	101	20	41	61	81	102	122	3.0

Tank Storage capacity = V	56,000	gal.	on all temperature sheets
Tank baffling constant = b	0.34		
Max distribution rate = r	300	gpm	
pH	7.5		Select CT from chart for each temperature.
Chlorine concentration = c	0.5	mg/L	
Log Inactivation	1		
CT Value from chart	21		
CT=[(V/r)*b+V']*c	31.7	mg/L/min	Read Ratio @ bottom of sheet
Ratio = [(V / r)* c * b] / CT	1.51 > 1 ∴ OK		

CT Calculation for Storage Capacity & Plugged Flow Piping

TABLE E-4 At 15° C (1) = 59° F

CT VALUES FOR INACTIVATION OF GIARDIA CYSTS BY FREE CHLORINE

Chlorine Concentration (mg./L)	pH = 7.0 Log Inactivation						pH = 7.5 Log Inactivation						
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	
<=0.4	12	23	35	47	58	70	14	28	42	55	69	83	<=0.4
0.6	12	24	36	48	60	72	14	29	43	57	72	86	0.6
0.8	12	24	37	49	61	73	15	29	44	59	73	88	0.8
1.0	13	25	38	50	63	75	15	30	45	60	75	90	1.0
1.2	13	25	38	51	63	76	15	31	46	61	77	92	1.2
1.4	13	26	39	52	65	78	16	31	47	63	78	94	1.4
1.6	13	26	40	53	66	79	16	32	48	64	80	96	1.6
1.8	14	27	41	54	68	81	16	33	49	65	82	98	1.8
2.0	14	28	42	55	69	83	17	33	50	67	83	100	2.0
2.2	14	28	43	57	71	85	17	34	51	68	85	102	2.2
2.4	14	29	43	57	72	86	18	35	53	70	88	105	2.4
2.6	15	29	44	59	73	88	18	36	54	71	89	107	2.6
2.8	15	30	45	59	74	89	18	36	55	73	91	109	2.8
3.0	15	30	46	61	76	91	19	37	56	74	93	111	3.0

Chlorine Concentration (mg./L)	pH = 8.0 Log Inactivation						pH = 8.5 Log Inactivation						
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	
<=0.4	17	33	50	66	83	99	20	39	59	79	98	118	<=0.4
0.6	17	34	51	68	85	102	20	41	61	81	102	122	0.6
0.8	18	35	53	70	88	105	21	42	63	84	105	126	0.8
1.0	18	36	54	72	90	108	22	43	65	87	108	130	1.0
1.2	19	37	56	74	93	111	22	45	67	89	112	134	1.2
1.4	19	38	57	76	95	114	23	46	69	91	114	137	1.4
1.6	19	39	58	77	97	116	24	47	71	94	118	141	1.6
1.8	20	40	60	79	99	119	24	48	72	96	120	144	1.8
2.0	20	41	61	81	102	122	25	49	74	98	123	147	2.0
2.2	21	41	62	83	103	124	25	50	75	100	125	150	2.2
2.4	21	42	64	85	106	127	26	51	77	102	128	153	2.4
2.6	22	43	65	86	108	129	26	52	78	104	130	156	2.6
2.8	22	44	66	88	110	132	27	53	80	106	133	159	2.8
3.0	22	45	67	89	112	134	27	54	81	108	135	162	3.0

Tank Storage capacity = V	56,000 gal.	on all temperature sheets
Tank baffling constant = b	0.34	
Max distribution rate = r	300 gpm	
pH	7.5	Select CT from chart for each temperature.
Chlorine concentration = c	0.5 mg/L	
Log Inactivation	1	
CT Value from chart	29	
CT=[(V/r)*b+V']*c	31.7 mg/L/min	Read Ratio @ bottom of sheet
Ratio = [(V / r)* c * b] / CT	1.09 > 1 ∴ OK	

SEP 0 7 2004

CT Calculation for Storage Capacity & Plugged Flow Piping

TABLE E-3 At 10° C (1) = 50° F

CT VALUES FOR INACTIVATION OF GIARDIA CYSTS BY FREE CHLORINE

Chlorine Concentration (mg./L)	pH = 7.0 Log Inactivation						pH = 7.5 Log Inactivation						
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	
<=0.4	17	35	52	69	87	104	21	42	63	83	104	125	<=0.4
0.6	18	36	54	71	89	107	21	43	64	85	107	128	0.6
0.8	18	37	55	73	92	110	22	44	66	87	109	131	0.8
1.0	19	37	56	75	93	112	22	45	67	89	112	134	1.0
1.2	19	38	57	76	95	114	23	46	69	91	114	137	1.2
1.4	19	39	58	77	97	116	23	47	70	93	117	140	1.4
1.6	20	40	60	79	99	119	24	48	72	96	120	144	1.6
1.8	20	41	61	81	102	122	25	49	74	98	123	147	1.8
2.0	21	41	62	83	103	124	25	50	75	100	125	150	2.0
2.2	21	42	64	85	106	127	26	51	77	102	128	153	2.2
2.4	22	43	65	86	108	129	26	52	79	105	131	157	2.4
2.6	22	44	66	87	109	131	27	53	80	107	133	160	2.6
2.8	22	45	67	89	112	134	27	54	82	109	136	163	2.8
3.0	23	46	69	91	114	137	28	55	83	111	138	166	3.0

Chlorine Concentration (mg./L)	pH = 8.0 Log Inactivation						pH = 8.5 Log Inactivation						
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	
<=0.4	25	50	75	99	124	149	30	59	89	118	148	177	<=0.4
0.6	26	51	77	102	128	153	31	61	92	122	153	183	0.6
0.8	26	53	79	105	132	158	32	63	95	126	158	189	0.8
1.0	27	54	81	108	135	162	33	65	98	130	163	195	1.0
1.2	28	55	83	111	138	166	33	67	100	133	167	200	1.2
1.4	28	57	85	113	142	170	34	69	103	137	172	206	1.4
1.6	29	58	87	116	145	174	35	70	106	141	176	211	1.6
1.8	30	60	90	119	149	179	36	72	108	143	179	215	1.8
2.0	30	61	91	121	152	182	37	74	111	147	184	221	2.0
2.2	31	62	93	124	155	186	38	75	113	150	188	225	2.2
2.4	32	63	95	127	158	190	38	77	115	153	192	230	2.4
2.6	32	65	97	129	162	194	39	78	117	156	195	234	2.6
2.8	33	66	99	131	164	197	40	80	120	159	199	239	2.8
3.0	34	67	101	134	168	201	41	81	122	162	203	243	3.0

Tank Storage capacity = V	56,000	gal.	on all temperature sheets
Tank baffling constant = b	0.34		
Max distribution rate = r	300	gpm	
pH	7		Select CT from
Chlorine concentration = c	1	mg/L	chart for each
Log Inactivation	1		temperature.
CT Value from chart	45		
CT=[(V/r)*b+V']*c	63.5	mg/L/min	Read Ratio
Ratio = [(V / r)* c * b] / CT	1.41	> 1 ∴ OK	@ bottom of sheet

Volume =(length)(width)(height) = 125.1 ft3, 935.7 gallons
Length: 4'9" (57")
Width 4'0' (48")
Height: 6'7" (79")
Volume =(length)(width)(height) = 125.1 ft^3, 935.7 gallons

Volume of media
Length: 4'9" (57")
Width: 4'0" (48")
Height: 42"
Volume: 66.5 ft^3, 497.42 gallons
Porosity: 0.5
Volume of clarifier-Volume of media (porosity)=Adjusted Volume
(SeeEPA Disinfection Profiling and Benchmarking Guidance Manual, pg 3-30
http://www.epa.gov/safewater/mdbp/pdf/profile/benchpt2.pdf) A35
Adjusted Volume of Clarifier = 935.7-497.42(0.5) =**687 gallons**

Volume of Each Filter Unit
Length: 4' 0" (48") X 2
Width: 3' 9" (45")
Height: 6' 1" (73")
Volume (l x w x h):182.5 ft^3, 1365.1 gallons

Volume of media
Length: 4' 0" X 2
Width : 3' 9"
Height: 40"
Volume: 100 ft^3, 748 Gallons
Porosity: 0.5

Volume of Filter-Volume of media (porosity)=Adjusted Volume
Adjusted Volume of Filter=1365.1 - 748=**617.1 gallons**

Volume of Pipeline from Clearwell **to First Customer**

Pipe Sections: Volume= $\pi (d/2)^2 (L)$

Length: 525 ft
Diameter: 10 in.
Volume: $\pi (0.83/2)^2 (525) = 286 \text{ ft}^3 = 2141$ gallons

Length: 645 ft
Diameter: 8 in.
Volume: $\pi (0.67/2)^2 (645) = 225 \text{ ft}^3 = 1684$ gallons

Length: 260 ft
Diameter: 6 in.
Volume: $\pi (0.5/2)^2 (260) = 51 \text{ ft}^3 = 381$ gallons

Total Volume = 2141 + 1684 + 381 = **4206 gallons**

APPENDIX K

DAILY MONITORING LOGS

STATE MONTHLY MONITORING SUMMARY FORM

SEP 0 4 2004

Daily Monitoring Log

Department of Health Services Drinking Water Field Operations Branch

System name: Campo Hills Project **1350 Front Street, Room 2050 San Diego, CA 92101 Attention: Brian Bernados**

System number _____

Year _____ Month _____ Operator Signature _____ date _____

day of month	time of day	sample by operator	raw water		chlorine contact time	chlorine residual	R D C average	water turbidity NTU			hour meter reading	complaints odor / taste
			temp	pH				raw	finished	reduction		
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												
Average or total for month								NTU	NTU	NTU	hrs.	

Routine Bac-T samples required per month = 1 number collected = _____ number of positive tests _____ (if any attach explanation)

Reports of Gastrointestinal Complaints = _____ date _____ (if any attach explanation)

Number of incidences of turbidity greater than 0.5 NTU = _____ date _____ (# of high turbidity tests / total tests) x 100 = _____ %

[(Average raw water NTU - average effluent NTU) / Total no. of samples] x 100 = _____ % (must be greater than 80%)

U 2 1

Surface Water Monitoring Form **San Diego County Health Department**

System Name _____ **Month** _____

Date	Time	Operator	Water Temp*	pH*	Residual*	Meets CT (Y/N)	Water Turbidity		Comments
							Raw	Finished	
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									

inished water readings for CT calculations

Operator Signature _____ _____ **<-- 95th Percentile**

2
2

MONTHLY SUMMARY OF MONITORING
FOR SURFACE WATER TREATMENT REGULATIONS

System Name: Campo Hills Project **System No.:** _____

Treatment Plant Name: _____ **Month:** _____ **Year:** _____

Treated Water Turbidities Every Four Hours (NTU)*

...e	Average Raw Water Turbidity	Peak Raw Water Turbidity	Peak Settled Water Turbidity	Midnight to 0400	0400 to 0800	0800 to Noon	Noon to 1600	1600 to 2000	2000 to Midnight	Average	Minimum CT Ratio
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
...											
24											
25											
26											
27											
28											
29											
30											
31											
Average											
Minimum											
Maximum											

If a continuous monitoring turbidimeter is used, determine the discrete turbidity value for the same times during each four hour period.

Total No. of Samples: _____ No. of readings less than or equal to 0.5 NTU: _____

% Readings less than or equal to 0.5 NTU = $\frac{\text{No. readings } 0.5 <= \text{NTU}}{\text{Total No. of Samples}}$ x 100% = _____

Meets Standard (i.e. At least 95% of readings are less than or equal to 0.5 NTU) (Yes/No)? _____

Average percent reduction during the month = $\frac{\text{Average Raw NTU - Average Effluent NTU}}{\text{Average Raw NTU}}$ x 100% = _____

Meets Standard (i.e. Reduction is at least 80%) (Yes/No)? _____

95th Percentile Value (95% of all turbidity values are less than or equal to this value) of all turbidity readings: _____

...cidents of turbidity greater than 1.0 NTU

Date of Incident									

APR 0 7 2004

Maximum Value (NTU)									
Duration (hr:min)									

Total No. of incidents where turbidity was >1.0 NTU: _____ , >5.0 NTU: _____

Meets Standards (I.e. NTU is not > 1.0 for more than eight consecutive hours) (Yes/No): _____

ıcing the filter back into service after any interruption (e.g. backwashing), did the filter effluent comply with the following criteria:

a. Less than or equal to 2.0 NTU after all events (Yes/No)? _____

b. Less than or equal to 1.0 NTU after 90% of events (Yes/No)? _____

c. Less than or equal to 0.5 NTU after four hours (Yes/No)? _____

Indicate the dates on which the turbidimeters that are used for regulatory monitoring purposes were calibrated:

Date	Which Turbidimeter	Which standards used, primary or secondary	Date	Which Turbidimeter	Which standards used, primary or secondary

DISINFECTION PROCESS DATA

Disinfectant residual type (check one):

free chlorine _____

combined chlorine _____

other _____

ncidents of disinfectant residuals less than 0.2 mg/l at the plant effluent:

Date of Incident									
Duration (hr:min)									
Date Department Notified									

Total No. of incidents where residual is < 2.0 mg/l: _____

Meets Standard (I.e. is not less than 0.2 mg/l for more than four hours (Yes/No)? _____

No. of distribution system residual samples collected:	
No. of distribution system samples for HPC only:	
Total No. residual and/or HPC samples collected:	
No. of samples with no detectable residual and HPC is not measured:	
No. of samples with no detectable residual and HPC > 500 CFU/ml:	
No. of samples for HPC only and HPC > 500 CFU/ml:	
Total No. samples with no residual and/or HPC > 500 CFU/ml:	

Compute V where V = (1 - $\frac{\text{Total No. samples with no residual and/or HPC > 500 CFU/ml}}{\text{Total No. residual and/or HPC samples collected}}$) x 100% = _____

Meets Standard (I.e. V is at least 95%) (Yes/No)? _____

SUMMARY OF WATER QUALITY COMPLAINTS

ene·al Complaints:

ype of Complaint	Number	Corrective Actions Taken
aste/Odor		

SEP 0 7 2004

Color		
Turbidity		
Suspended Solids		
Other (Describe)		

Reports of Gastrointestinal Illness (Attach additional sheets if necessary):

Reporting	Date	Corrective Actions Taken

Attach an explanation of any failure of the performance standards or operating criteria and corrective action taken or planned

Summary completed by:

Signature	Title	Date

SEP 0 7 2004

APPENDIX L

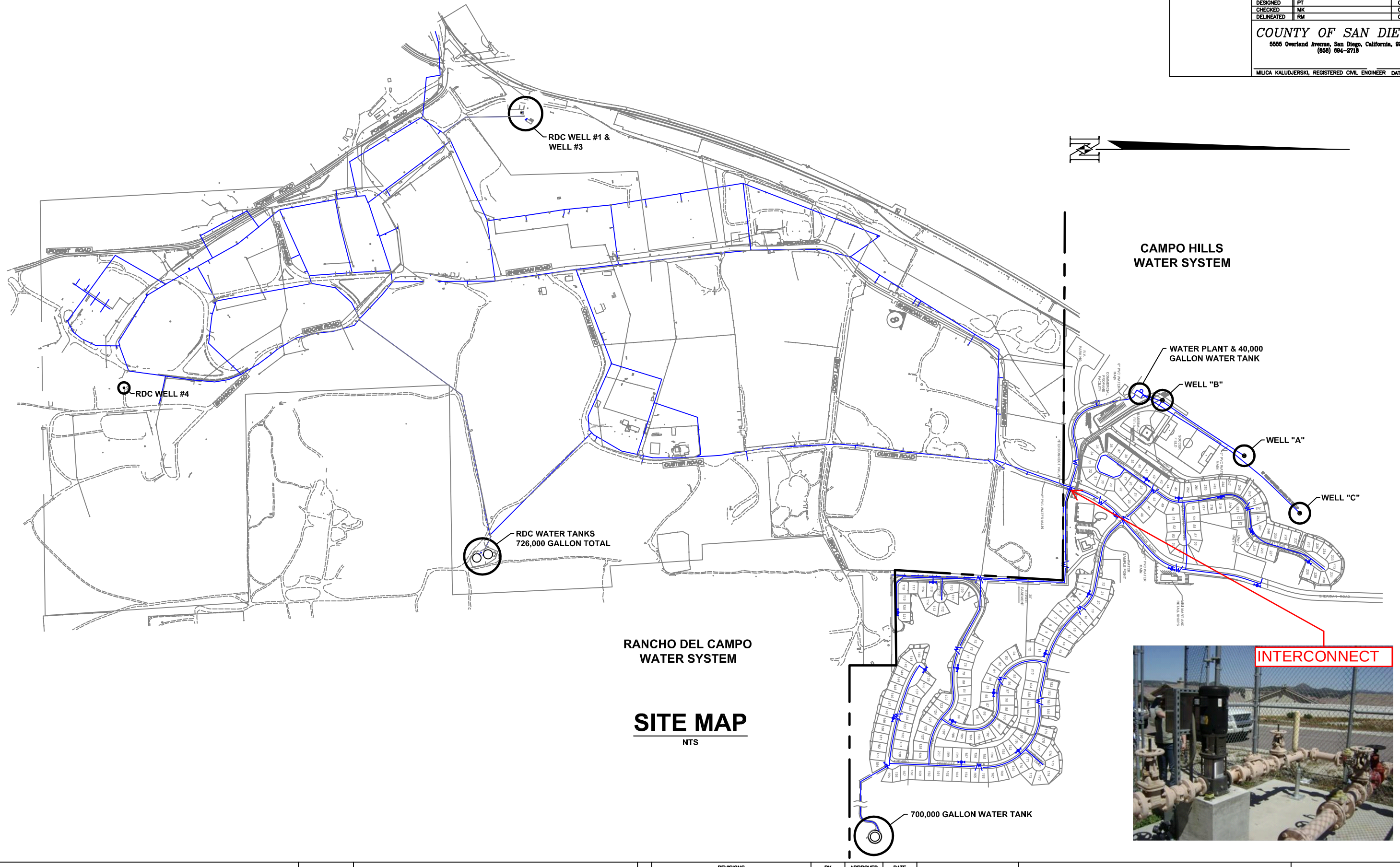
RACNHO DEL CAMPO WATER SYSTEM, CAMPO HILLS WATER SYSTEM, AND INTERCONNECT FACILITY

SITE MAP

PLANS	BY	DATE
DESIGNED	PT	02/09
CHECKED	MK	02/09
DELINEATED	RM	02/09

COUNTY OF SAN DIEGO
5555 Overland Avenue, San Diego, California, 92123
(858) 694-2715

MILICA KALUDJERSKI, REGISTERED CIVIL ENGINEER DATE



RANCHO DEL CAMPO
WATER SYSTEM

SITE MAP

NTS

COUNTY OF SAN DIEGO DPW WASTEWATER MANAGEMENT SECTION

REVIEWED BY: _____ DATE _____

COUNTY OF SAN DIEGO 5555 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295	WASTEWATER MANAGEMENT	REVISIONS	BY	APPROVED	DATE	COORDINATE INDEX N/A N. N/A E. CONST. COMPL. _____ FIELD REVISIONS _____	RANCHO DEL CAMPO AND CAMPO HILLS WATER SYSTEM WELL IMPROVEMENT AND CONSOLIDATION OF CAMPO WATER SYSTEMS	SCALE: NONE DWG NO. _____ SHEET 2 OF 3 SHEETS